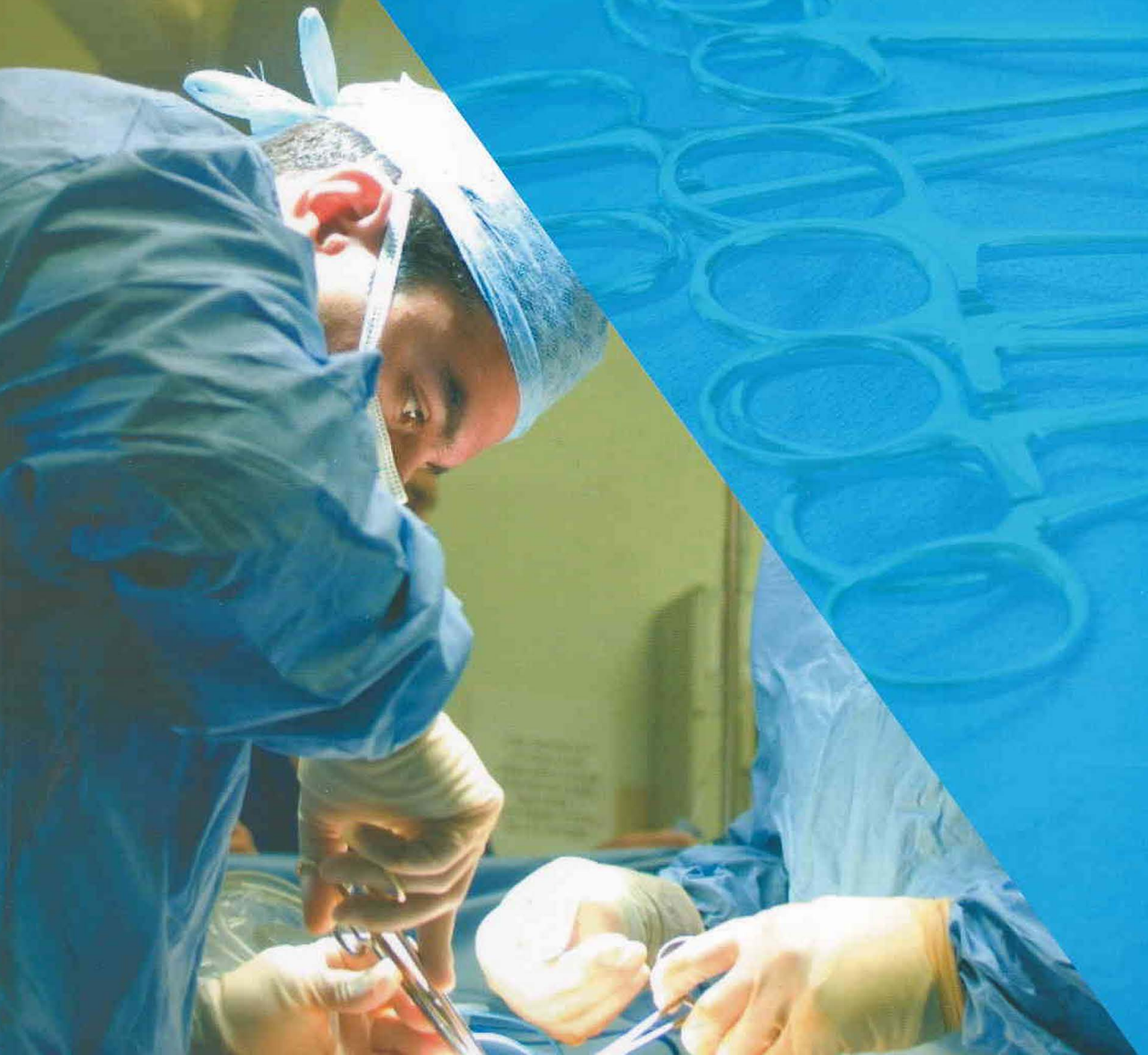


Surgical Operations

Dr.Mohammed El-Matary



VISIT...

LANZAROTE
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General Principles of Surgical Operations

Types of suture materials

I- Absorbable sutures:

A. Natural:

1. Plain catgut:

- From the submucosal collagen of the sheep's intestine.
- Time of absorption: one week. (absorbed by phagocytosis)
- Uses: Its use is limited now because of severe reactions.

2. Chromic catgut:

- Like plain catgut, but it is modified by chromium salt solution to make it less irritant and to increase time of absorption to 3 weeks.

B. Synthetic:

1. Dexon (polyglycolic acid):

- Multifilamentous with good tensile strength,
- Time of absorption: 4 months.

2. PDS (Polydioxanone synthetic smooth suture):

- It is monofilamentous, so it is useful in suturing infected or contaminated wounds
- Time of absorption: 6 months.

3. Vicryl (polyglactin):

- It is multifilamentous.
- Time of absorption: after 4 months.
- Used now: for gastrointestinal anastomosis.

4. Monocryl polyglecapron 25:

- Monofilament with high tensile strength.
- Time of absorption: 3-4 months.

II- Non absorbable sutures:

A. Natural:

Surgical silk:

- It is multifilamentous.
- Rich in protein material so it causes marked tissue reaction.
- If infection occurs, we remove sutures to allow improvement.

B. Synthetic:

1. Nylon (Ethilon):

- It is polyamide.
- Mono-or multifilamentous with good tensile strength.

2. Prolene (Polypropylene):

- Monofilamentous with good tensile strength
- But: it has difficult knotting.

3. Polytetrafluoroethylene (PTFE):

- Minimal tissue response with good handling.

4. Recently

- Stapler.
- Adhesive tapes.
- Stainless steel

NB:**1. monofilaments sutures:**

Made up of single strand, less harbouring of organisms, well suited for vascular surgery

2. multifilament sutures:

Made up of several filaments as strand, greater tensile strength

3. tensile strength:

Is the strength, which is required to hold the tissues in proper apposition

TYPES OF STITCHES

(Refer to CD videos)

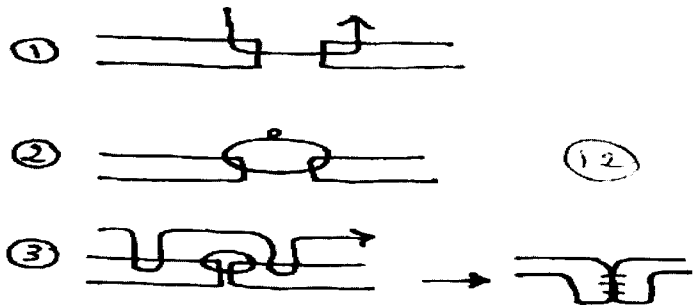
A. Interrupted:

1. Simple.
2. Mattress:
 - a. Vertical mattress.
 - b. Transverse (Horizontal) mattress.

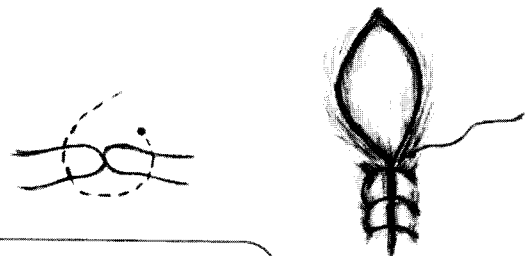
3. Lembert's suture:

It is the 2nd row of sutures:

- a- The 1st is all through
- b- The 2nd is the inverting sutures

**4. Tension suture.****B. Continuous:**

1. Simple overhead.
2. Blanket suture.
3. Quilted suture.
4. Lembert's suture.
5. Connell's suture. (loop on mucosa).



Suture removal

When

- It should be removed within 1-2 weeks depending on anatomical location
 1. Face → 5-7 days
 2. Scalp → 10 days
 3. Trunk & upper extremities → 10-14 days
 4. Lower extremities → 14-21 days

- Prompt removal reduce the risk of
 - suture marks
 - infection
 - tissue reaction

How

- Skin should be cleaned & sterilized
- Suture is gently elevated with forceps
- one side is cut
- then grasping by the knot then pulled towards the suture line

Alternative methods of wound closure

1. Steri- Strips
2. Staplers
3. Tissue adhesive
4. Barbed sutures

Types of Suture Needles
A. According to the shape of the needle:

(1) Straight: it is used in superficial structures e.g. skin.

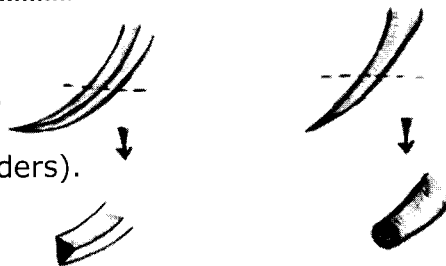
(2) Curved: either $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ of a circle.

**B. According to the cross section of the needle****(1) Rounded needle:**

Its cross section is circular
Used for organs, mucosa and intestines.

(2) Cutting needle:

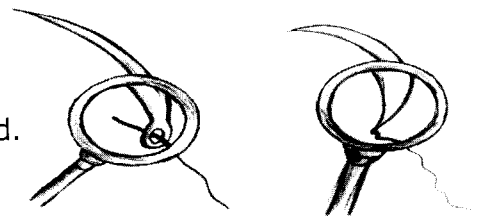
Its cross section is triangular (Sharp borders).
Used for sutures in the skin.

**C. According to the threading:****(1) Eyeless :**

- The thread is incorporated within the needle
- So the needle can not be threaded.
- Used in plastic, vascular, neuro-surgery, intestine and organs.

(2) Eyed needle:

- There is a small opening (eye) in the needle,
- So, it can be threaded and reused. Its use is limited.



STERILIZATION AND DISINFECTION

Sterilization:

- The complete destruction or removal of all forms of living micro-organisms (whether pathogenic or non-pathogenic).

Disinfection:

- Destruction of pathogenic forms of micro-organisms. Disinfectants are chemical substances that are usually toxic or irritant to the living tissues.

Antiseptics:

- Chemical substances which are less irritant or less toxic than the disinfectants and can be applied on the living tissues to destroy pathogenic forms of microorganisms.

METHODS OF STERILIZATION AND DISINFECTION:

- a- Chemical methods (disinfectants).
- b- Physical methods
 - Heat
 - Dry. - Moist.
 - Irradiation.
 - Filtration.

A- Physical Methods

A) Dry Heat

- 1) Incineration : destruction of contaminated materials by burning,
- 2) Direct flame.
- 3) Hot air oven.
- 4) Infra-red radiation

B) Moist Heat

Moist heat above 100°C: e.g. autoclaving (steaming under pressure).

	Moist Heat	Dry Heat
Mechanism of killing	Denaturation & coagulation of enzymes & proteins	Oxidation of essential cell constituents
Effective Temperature	Low(63, 100, 121°C)	High (160 °C or more)
Holding period	Short(15-18 min)	Long (1-2 hours)
Penetration	Yes	No (hot air is not)
Latent heat of steam	Yes	No
Sterilized objects	wet	dry

C) Irradiation

1. Ionizing radiations: (e.g. gamma and beta rays)

- Emitted from radioactive isotope (e.g. cobalt 60).
- Used for sterilization of materials which are damaged by heat, e.g. plastic syringes, rubber gloves, etc.

2. Ultraviolet rays:

- Have low penetration power.
- Used in surgical rooms and drug factories.
- Reduce the number of bacteria in air.

D) Filtration

- Used to sterilize fluids which are damaged by heat e.g, serum, plasma, vitamins, etc.
- Millipore filters made of synthetic membranes (cellulose) are available in different pore sizes.

B- CHEMICAL DISINFECTANTS

Group	Brand
ALCOHOLS	70% Ethyl Alcohol (100% Alcohols cannot penetrate cell membrane)
ALDEHYDES: Formaldehyde Glutaraldehyde	Formalin Cidex
HALOGENKS: Hypochlorite Hypobromite Iodine Povidone Iodine	Chlorox Vim Betadine
Colored Phenolic	Phenique
Quaternary Ammonium Compounds (Q.A.Cs): Cetrimide	Cetavlon
HYDROGEN PEROXIDE	

Ref.→ Belly & Love p.135

General scheme

1- Indications:**2- Contraindications:****3- Preoperative preparation:****4- Anesthesia:** usually general, may be spinal in lower half of body.**5- Steps:**

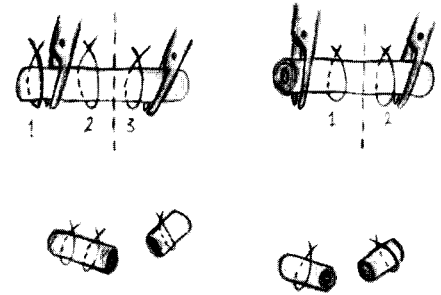
1. Position.
2. Skin preparation.
3. Incision.
4. Procedure.
5. Closure.
6. Post-operative care.

6- Complications:**1. Hge:****1ry:**

- Due to injury of a blood vessel.
- During the operation.
- Controlled by pack for 4 min till VC.

Hold the vessel with Artery forceps → ligate it:

- Artery with 3 ligatures & cut between the 2 & 3.
- Vein with 2 ligatures & cut between them.

**2ry:**

- Due to wound infection.
- After few days of the operation.
- It needs pack & IV antibiotics.

No sutures as:

- Edematous friable tissue.
- Proteolytic enzymes → lysis of the sutures.
- The bacteria eat the nutrition of the tissues).

Reactionary:

- Due to slipped ligature due to hypertension or loose sutures.
- In the first 24 hr post operative.
- Patient is re-explored & the bleeder is controlled.

(NB: Blood transfusion may be needed in all these types of hge)

2. Wound complications:**a) Wound infection:**

- If within 3days → room operating room or tools.
- If in 5-7days → from the wards.

Treatment:

- Open stitches, take smear → culture & sensitivity.
- Leave the wound open & give Ab accordingly.
- Healing with 2ry intention in 2 months → ugly scar or with. delayed 1ry closure instead → better.

b) Keloid

3. Injury of imp. Structures: → According to each operation.

4. Abdominal Operation complications:

- **Chest:** chest infection, atelectasis.
- **LL:** DVT.
- **Abdomen:** paralytic ileus, gastric dilatation & burst abdomen.

Subtotal Thyroidectomy

I- Indications: بالترتيب

- 1- Toxic multinodular goitre.
- 2- Simple multinodular goitre in:
 - Large goitre with pressure manifestations.
 - Cosmotic disfigurement.
 - Malignant changes.
- 3- Toxic solitary nodule.
- 4- Retrosternal goitre.
- 5- Malignant goitre (Total or near total)
- 6- Graves':
 - After failure of medical Treatment.
 - Large goitre with pressure manifestations.
 - Socio-economic cause.
- 7- Hashimoto thyroiditis.

II- Preoperative preparation:

- If toxic: → medical preparation (must be euthyroid).
 - If exophthalmos: exophthalmos static measures for 6 months.
 - Thyroid antibody titre, in thyroiditis.
 - Blood for Thyrotoxicosis.
 - Chest X-Ray for retrosternal extension.
 - Valium at night of operation.
 - Indirect laryngoscopy (detects silent RLN palsy)
 - for medico-legal purpose.
 - Morphine & hyoscine.
- (Instead of atropine in toxic cases as atropine causes tachycardia).

III- Anesthesia: → GA (Nitrous oxide & oxygen)

IV- Steps:

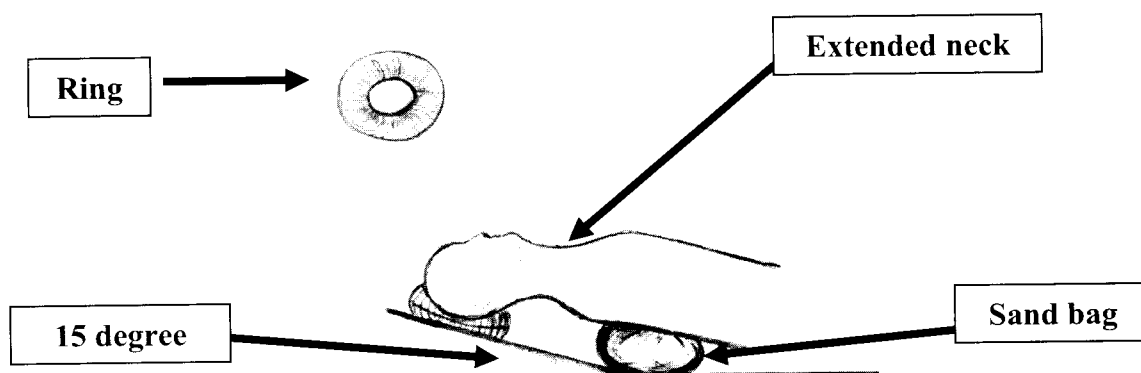
Position: Of the patient:

- ☞ supine
- ☞ shoulder supported on a sand bag to extend neck
- ☞ head on a ring to prevent side displacement

Of the table: → Head tilt up 15° to ↓ venous engorgement.

Adverse effect → Increases incidence of air embolism if a large vein is injured

Of the surgeon: → on the side opposite the lobe to be operated on.



Incision:

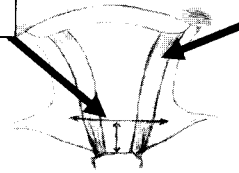
Mark the incision first with silk ligature.

Site:

- **Collar (Kocher's) incision** = 2 cm above the suprasternal notch, it extends to the posterior border of each sternomastoid.

2 cm above
sternal notch

Post. border
of
sternomastoid

**NB.**

1. In large goiter, it can be extended to external jugular vein.
2. If the incision is done on the sternal notch, the skin of the hyperextended neck will be displaced downwards over the manubrium which will lead to keloid formation.

Layers:

- Incise the skin then the superficial fascia with platysma. as the blood vessels to the skin pass through platysma

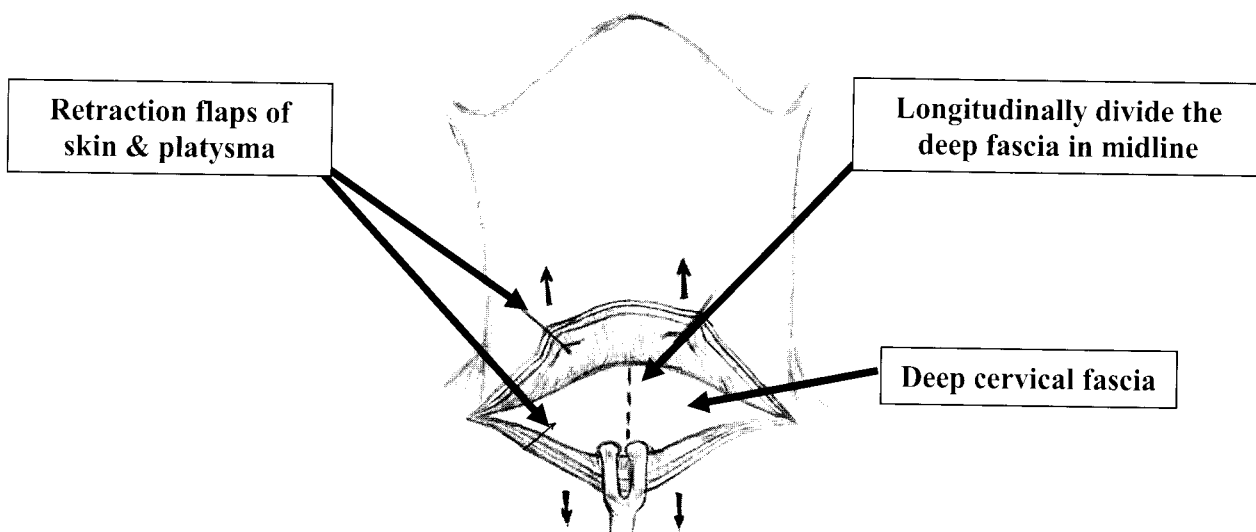


N.B. The platysma has to be closed with the SC tissue as a separate layer to avoid adherent ugly scar.

Procedure:**a-Elevate flaps of skin & platysma:**

- Superiorly to thyroid cartilage.
- Inferiorly to suprasternal notch.
- flaps are kept in position via :cecil-jule thyroid retractor or 3 silk sutures fixed to the towel.

Ramy rizk

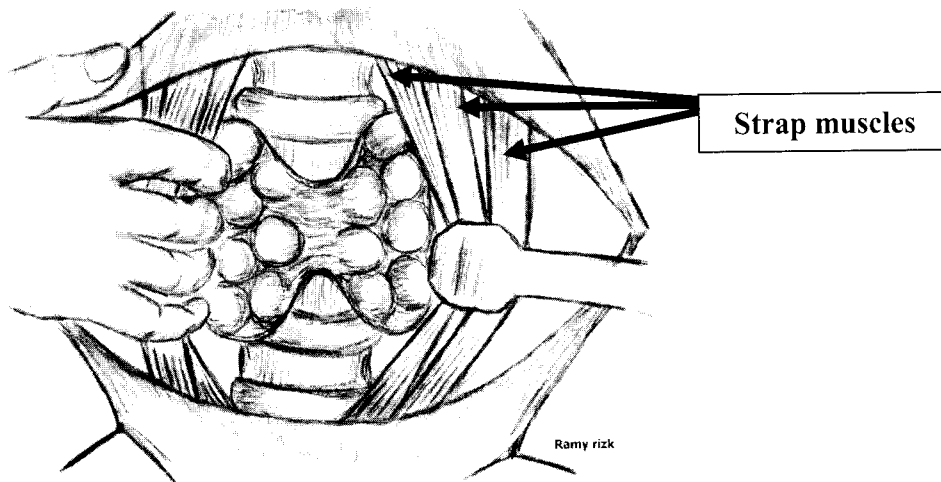


b-Divide the investing layer, pre-tracheal fascia longitudinally in midline.

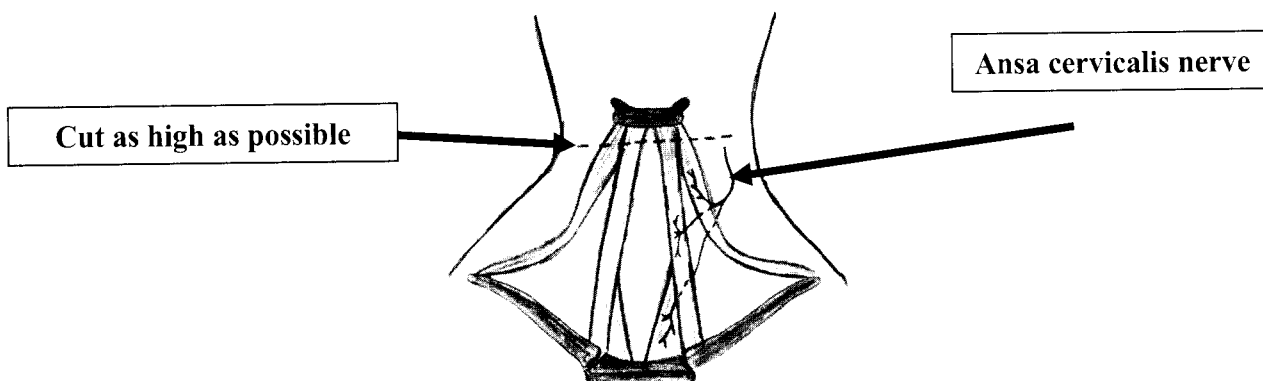


N.B. Midline is known by notch of thyroid cartilage & white line (Median raphe)

c-Separate the strap muscles & **reflect** them laterally.



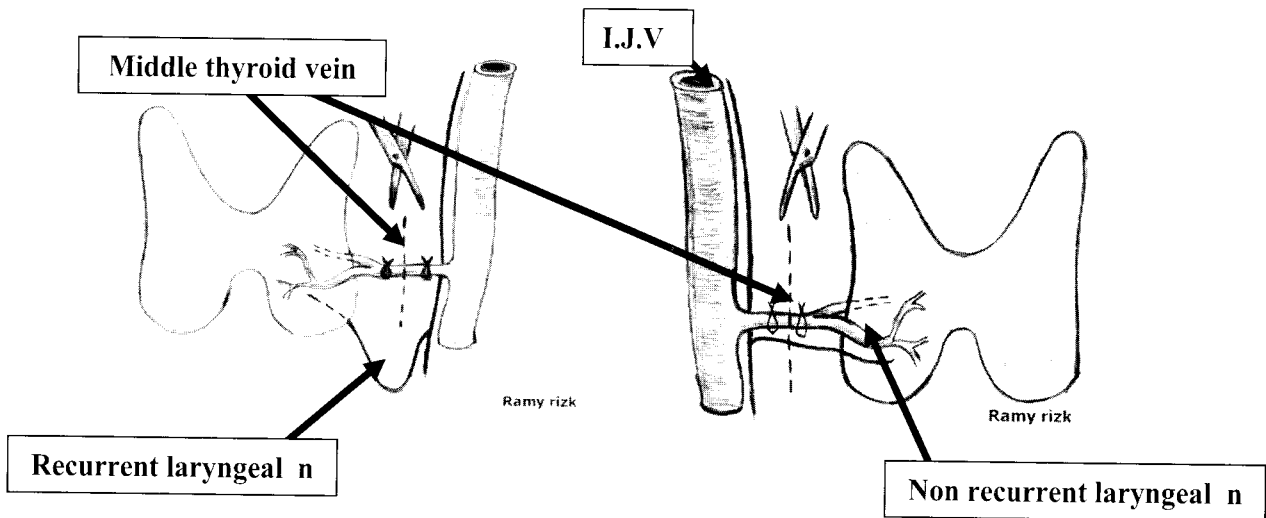
N.B. If necessary to divide the ms (in large goiter) → divide them as high as possible to preserve their nerve supply (ansa Cervicalis) which enters the lower part of the muscles.



d- Ligate & divide:

1) The middle thyroid vein:

- It is the **shortest** so it is the 1st to be ligated.
- **In 2% of cases** Rt. recurrent laryngeal n. may be non recurrent & therefore it may be injured during ligation of this vein.
- Nearer to the lower part of the gland.
- It may be absent, may be more than one.

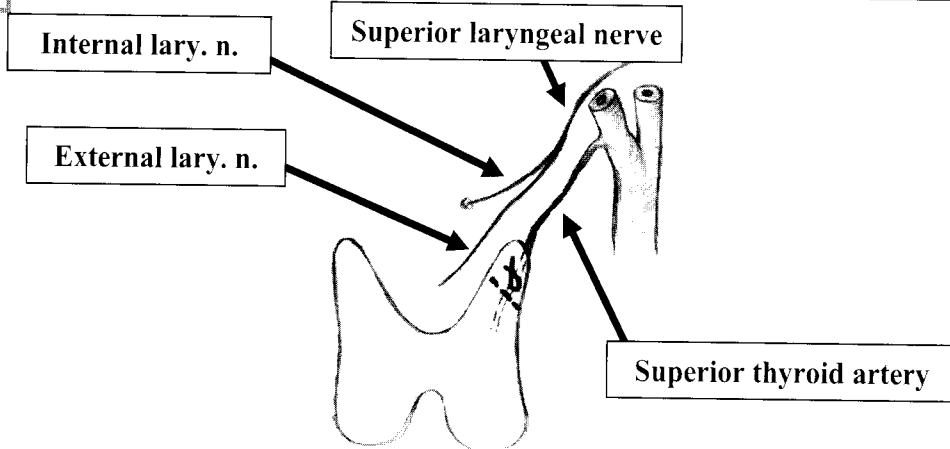


2) Superior thyroid artery & vein:

- At the **upper pole** of the gland
- **As close as** possible to the gland (& from medial to lateral)
- To avoid injury of **External laryngeal nerve**.



N.B. Injury to external laryngeal n. leads to paralysis of cricothyroid m.
→ loss of high pitched voice = (voice fatigue).



3) Inferior thyroid artery: (in toxic goitre)

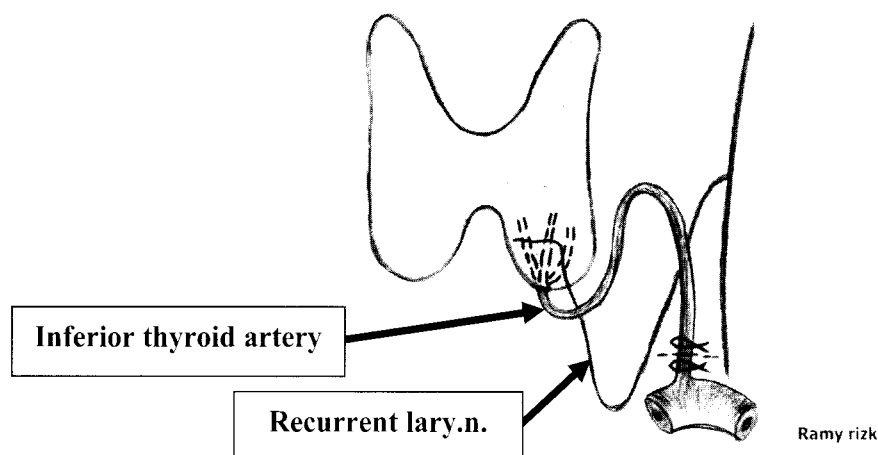
- At the lower pole of the gland.
- **Away** from the gland (behind carotid sheath).
- To **avoid** injury of recurrent laryngeal n.
- It is **ligated in continuity** to avoid fall of proximal stump in chest (necessitates thoracotomy if slipped ligature occurs).



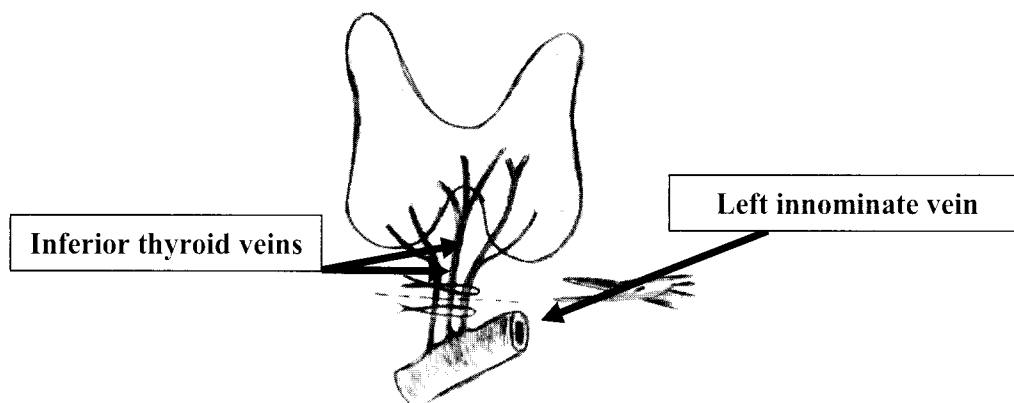
N.B. Some surgeons prefer to expose RLN within branches of inferior thyroid artery (i.e. near the gland) to avoid injury of blood supply of parathyroid gland.



N.B. Nowadays, the use of nerve stimulators is helpful in identifying the R.L.N. from the Inferior thyroid artery.



4) **Inferior thyroid veins (3-5):** → at lower pole



N.B. Artery is ligated before vein to avoid lobe congestion.

e- Delivery of thyroid lobe:

By blunt (finger) dissection from deep surface of pretracheal fascia & strap muscles.

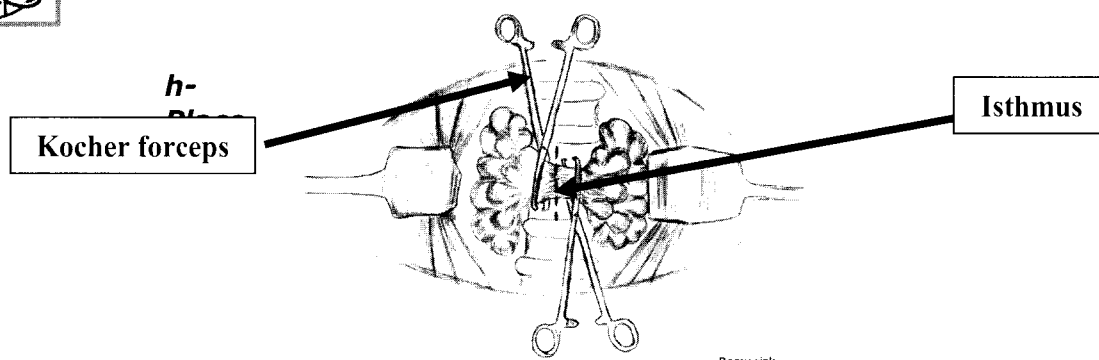
f-Exposure & devascularization of other lobe.

g-Divide the isthmus between 2 Kocher's forceps,

→ This causes barring of the trachea & relief of the pressure



N.B. Retrosternal extension is delivered by finger (sternotomy is rarely done).



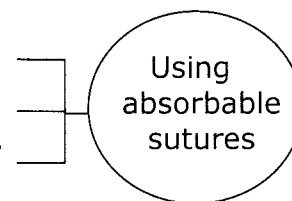
hemostats around margins of resection → leaving posteromedial portion (to protect the RLN & parathyroid glands).

Part to be left:

- In partial thyroidectomy we leave part equal to normal lobe.
- In subtotal thyroidectomy we leave part less than normal lobe:
 - In simple goiter part less than 1 cm (Or equal to the size of patient's thumb phalanx).
 - In toxic goiter part less than 1/2 cm.
 - Isthmus is removed in all operations why?
 1. Recurrent disease will give unsightly pretracheal lump.
 2. Facilitates access to the trachea if respiratory obstruction occurred.

Closure:

- Continuous suture to avoid haemorrhage from accessory tracheal & esophageal branches entering at ligament of Berry.
- Absolute hemostasis.
- Subfascial + SC suction drain.
- Close:
 - Pretracheal fascia at the midline.
 - Pretracheal muscles (if cut).
 - Subcutaneous tissue including the platysma.
 - Skin using:
 - a. Interrupted silk.
 - b. Subcuticular.
- Check vocal cords on extubation by direct laryngoscope.



Post operative care:

- Patient in semi-sitting position.
- Care of respiration.
- Remove drains after 24 hrs.

V- Complications:

1- Reactionary hge:

- Due to slipped ligature from thyroid vessels, stump, flap vessels, etc.
- With risk of suffocation due to mechanical compression on trachea & compression of venous drainage causing laryngeal edema.
- Open the wound at bed side if necessary.
- Return the pt to operating room for haemostasis.



N.B. Pain causes spasm of the muscles this cause more spasm of the trachea

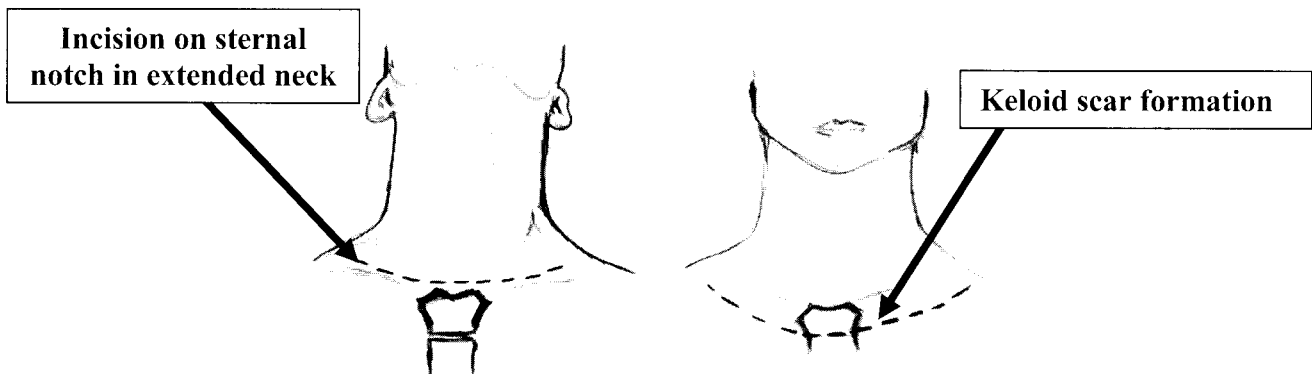
2- Injury of important structures:

- Nerves:
 - External Laryngeal Nerve: Cricothyroid muscle paralysis → Loss of high-pitched sound.
 - Internal Laryngeal Nerve: Chocking.
 - Recurrent Laryngeal Nerve: See thyroid gland (General Part I).
- Thyroid: → Hyperthyroidism or Hypothyroidism (according to the amount of the removed part).
- Internal Jugular Vein: → Air embolism.

- Trachea: → sutured by prolene (non-absorbable) as cartilage doesn't heal.
- Parathyroid: → Hypoparathyroidism.
 - Permanent:
 - Removal of the glands.
 - Temporary: from.
 - The stitches.
 - Use of cautery.
 - Bilateral ligation of inferior thyroid artery.

3- Keloid scar:

- Acute → Red in color.
- Chronic → Ugly scar.



4-Tetany:

- In first 3 days → bone hunger (corrected toxicity).
- After 1 week → hypoparathyroidism.
- C/P:
 - Latent tetany → Circumoral numbness (Earliest).
→ Trousseau's sign.
→ Chvostek's sign.
 - Manifest tetany: → Carpopedal spasm (Obstetric hand).
- TTT:
 - Acute attack: → Calcium chloride I.V. (10 ml).
 - Later → Vit.D (1-Alpha) + Calcium supplements.

5- Thyroid crisis: if poor preparation.

6- Resp. obstruction:

- Hge.
- bilateral vocal cord injury.
- Intraoperative aspiration due to full stomach.
- Laryngeal edema.
- Injury to trachea.

7- Recurrent thyrotoxicosis:

8- Wound infection:

► References:

- B. & L. p.776.
- McIver, Giuffrida, Goellner, J.R. (2001)/028-34.
- Mazza Ferri (93), England Journal of Medicine 328:55-9.
- Kuma, Matsuzuka, World Journal of Surgery 16:583-7

possible oral questions

- 1-what is the difference between unilateral lobectomy ,partial thyroidectomy ,subtotal thyroidectomy,near total thyroidectomy ,total thyroidectomy ,and what are indications of each?
- 2-kocher in surgery???(2 incisions,reduction of shoulder dislocation,forceps)
- 3-complications of simple nodular goiter??
- 4- ttt of thyrotoxicosis???
- 5-When and where we cut the strap muscles?
- 6-Clinical manifestations and management of thyroid crisis?
- 7-causes of postoperative dyspnea??
- 8-causes of postoperative change of voice?
- 9-manifestation and ttt of hypoparathyroidism???
- 10-management of postoperative progressive exophthalmos??

Sistrunk Operation**I- Indications:**

- Thyroglossal cyst.
- Thyroglossal fistula.

II- Steps:

- Transverse elliptical incision around the fistula or the cyst.
- Dissect the thyroglossal tract upto the tongue.
- Remove the central part of hyoid bone & a part of the base of floor of the tongue just below foramen cecum.

III- Complications:

- Recurrent cysts or fistulas:
 - due to incomplete removal of the thyroglossal tract.

Breast Operations

Simple Mastectomy

I- Indications:

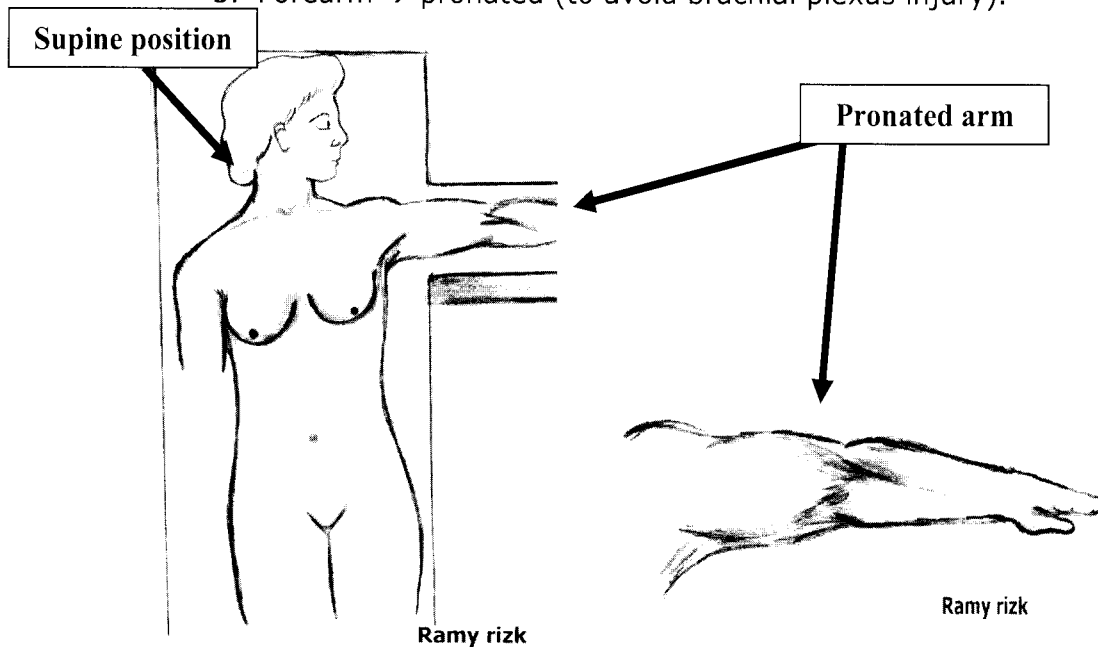
- 1) Stage III & IV Cancer Breast.
- 2) Acute mastitis Carcinomatosis.
- 3) Cystosarcoma phylloides.

III- Anesthesia: → GA

IV- Steps:

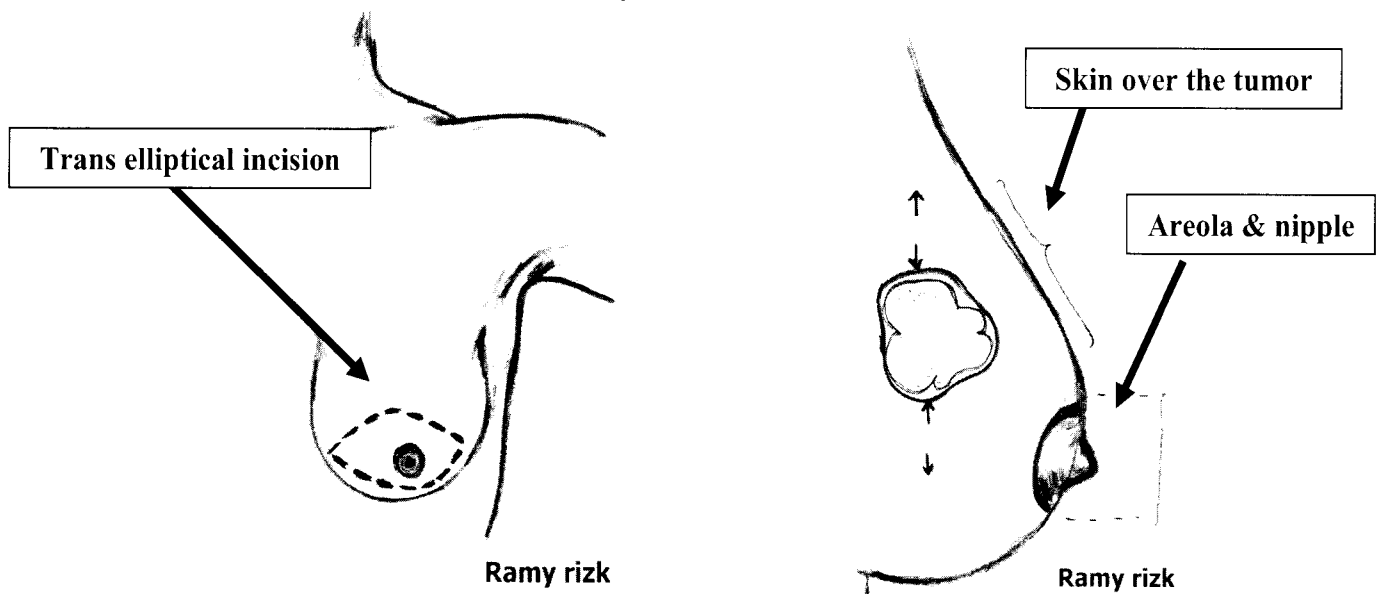
Position:

1. Body → supine.
2. Arm → extended & abducted (90) on an arm board.
3. Forearm → pronated (to avoid brachial plexus injury).



Incision:

- *Transverse elliptical incision*

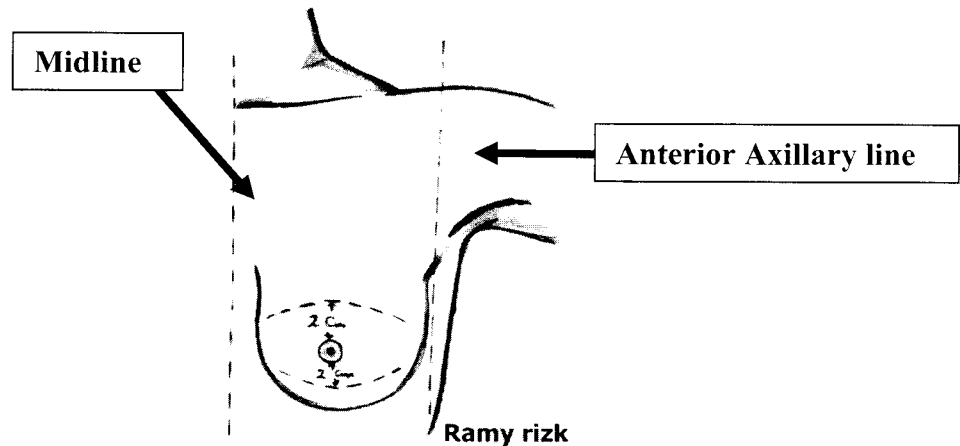


- ***It includes***

- The skin over the tumor.
- The nipple & areola.
(as it has the same lymph drainage of breast tissue).

- ***it extends***

- At least 2 cm above & below the nipple.
- From the midline (med) to ant. axillary line
(lat.).



Procedure:

1) **Elevate the upper & lower skin flaps**

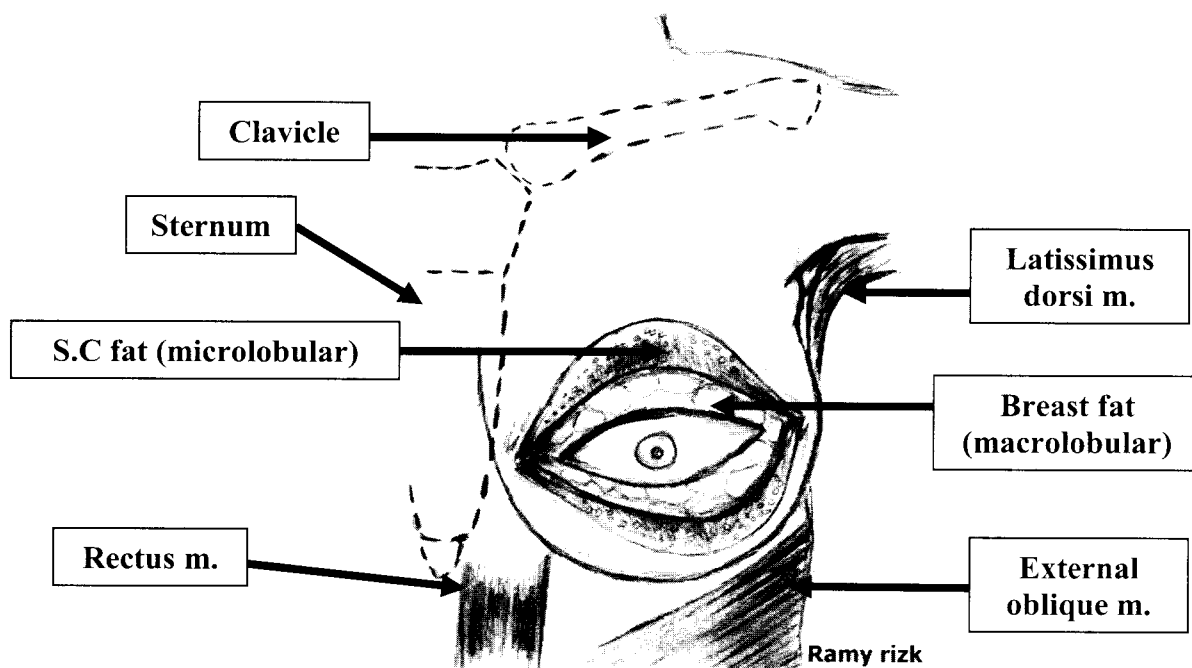
NB: the flaps

- Contain the underlying SC fat as it contains the blood supply of the skin.



N.B. How to differentiate S.C fat from breast fat?

(S.C. fat is microlobular ≠ breast fat is macrolobular).



→ The S.C fat should be the same thickness all through, to avoid the post-operative "Button-hole" appearance.

→ Extend from:

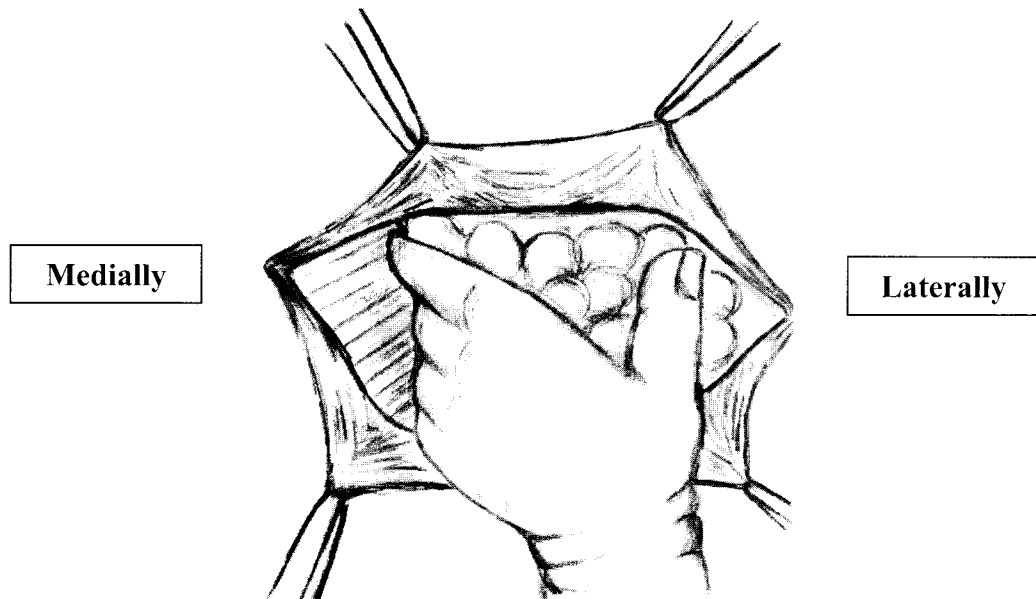
* **Sternum → medially.**

* **Lat border of latissimus dorsi → laterally.**

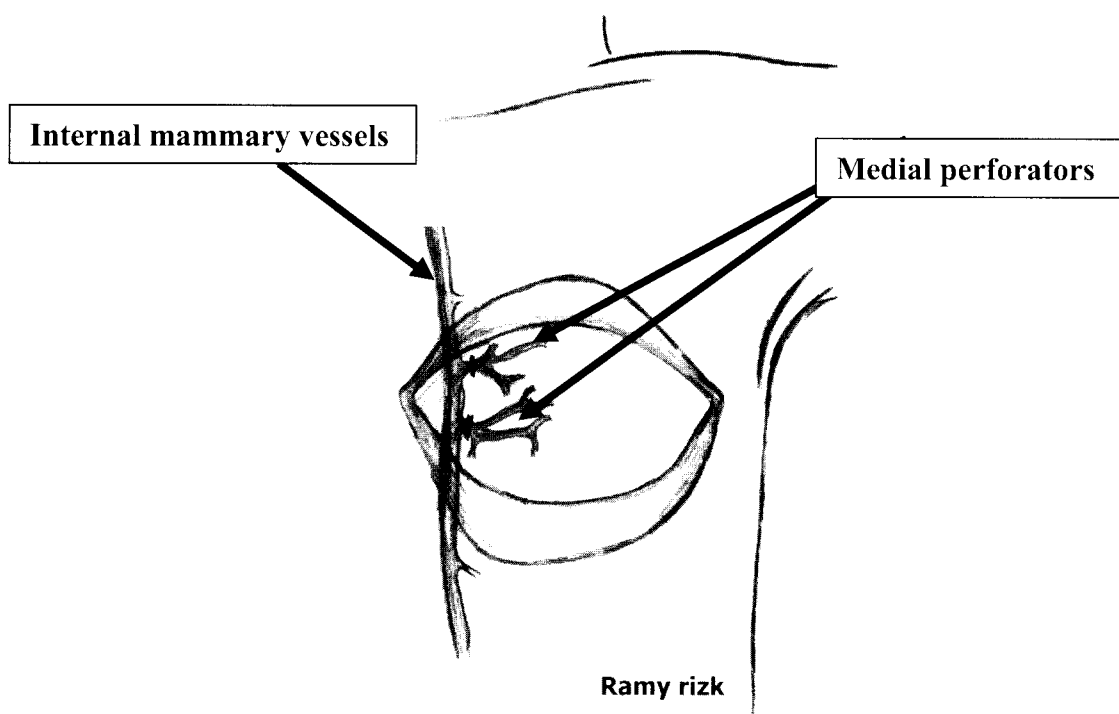
* **Lower border of clavicle → superiorly.**

* **Rectus sheath & ext oblique → inferiorly.**

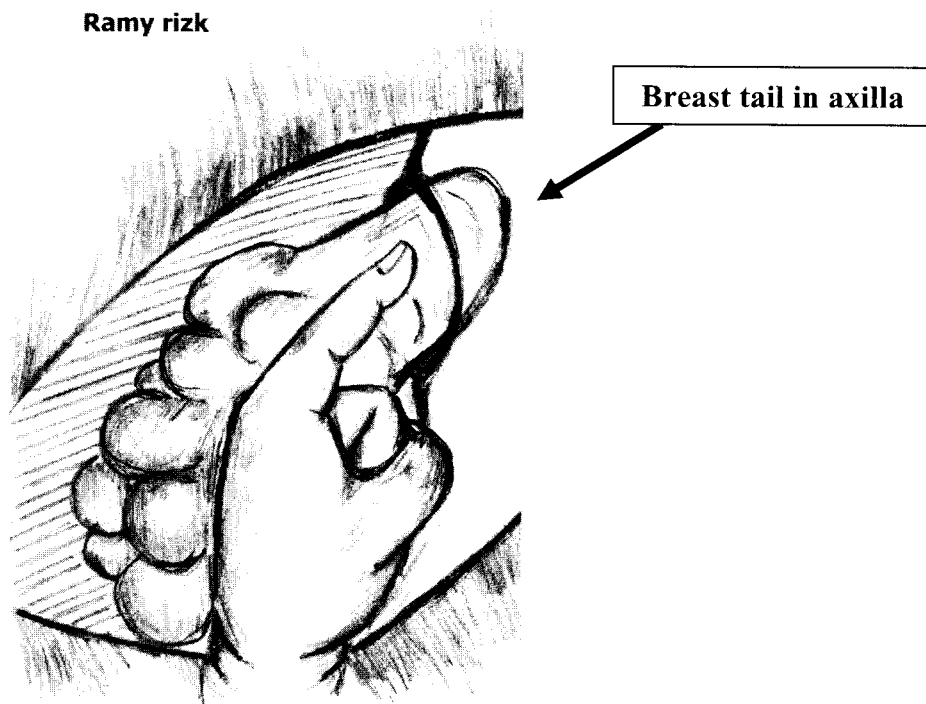
2) Sweep off the breast tissue (starting medially).



3) Ligate the perforating branches of the int. mammary vessels (medially)



4) Dissect the axillary tail by your finger from the opening of Langer



5) send the specimen for histological exam:

Closure:

- A- Absolute haemostasis.
- B- Place suction drains.
- C- Close the skin in a single layer with interrupted sutures.

Types of breast surgery for cancer breast:

1- Extended radical mastectomy:

= Remove:

- **2 skin:**
 - Over the tumor.
 - 5 cm safety margin.
- **2 breast:**
 - Breast tissue.
 - Breast nipple & areola.
- **2 ms:**
 - Pect. major.
 - Pect minor.
- **2 f:**
 - All fat.
 - All fascia.
- **2 LN:**
 - Internal mammary L.Ns.
 - Axillary L.Ns.

2- Radical mastectomy:**= Remove**

- As 1.
- Except: internal mammary L.Ns.

3- Modified Radical mastectomy:**= Remove:**

- As 2.
- Except pectoralis major.

4- Simple mastectomy & sampling of axilla:**= Remove:**

- As 3.
- Except pectoralis minor.

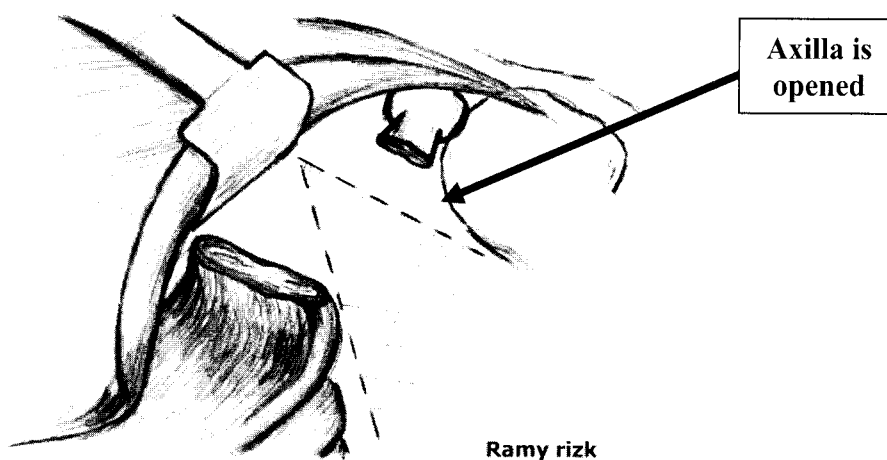
5- Lympectomy / Quadrantectomy

Modified Radical Mastectomy

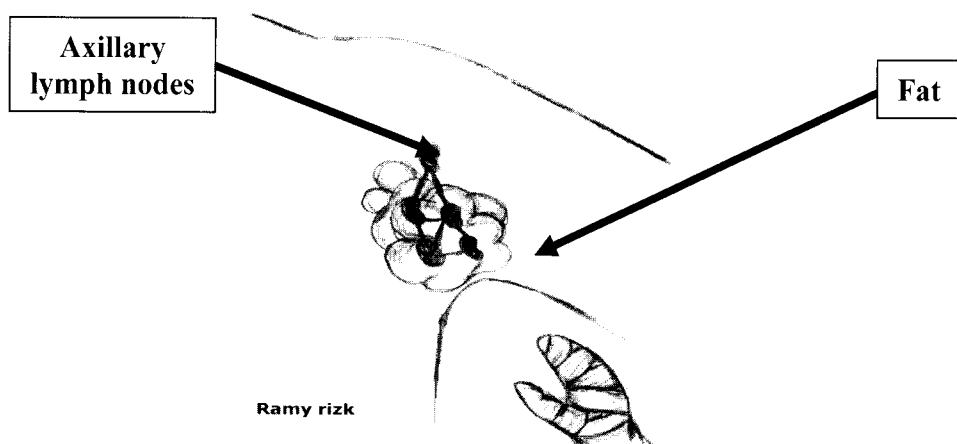
Patey's operation

Indications: → stage I & II breast cancer.**II, III, IV** → **1, 2, 3, 4 (a, b)** → as simple mastectomy.**c) Retract** the pect. major at its lateral border, so pect. minor is exposed.**d) Divide** the pect. Min.or at its insertion (better as it is avascular).The axilla is exposed

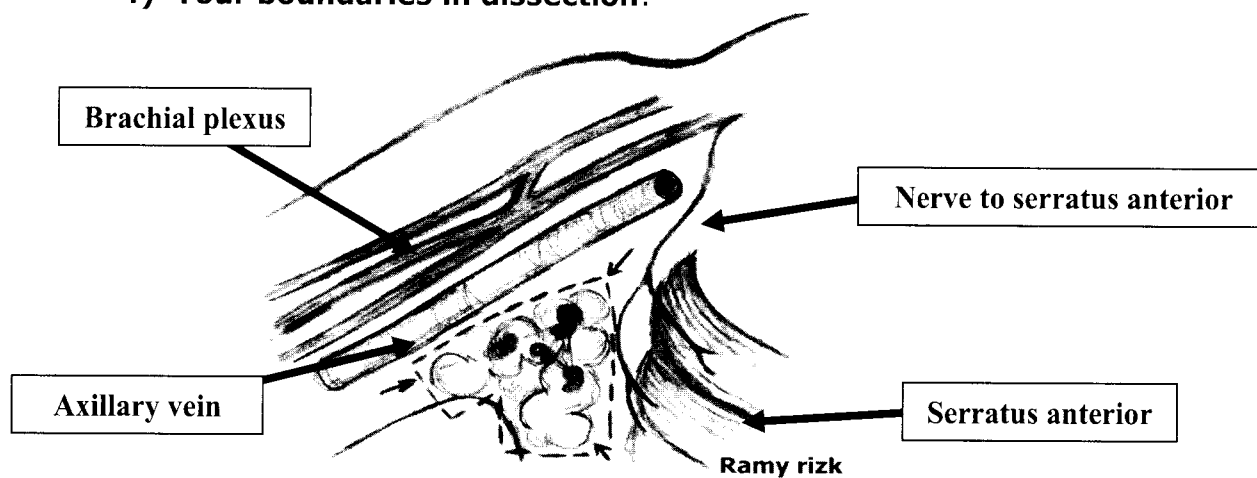
N.B. Pectoralis minor is called "Door of axilla"



e) **Sweep off** the axillary fat & LN in downward direction by a gauze



f) **Your boundaries in dissection:**



Above = axillary v. (to avoid br. plexus injury)



N.B. The landmark of the apical LN is the subclavius ms. & 1st rib.

Behind = until the ms of the post axillary wall
(= subscapularis, teres major, latissimus dorsi)

**N.B.**

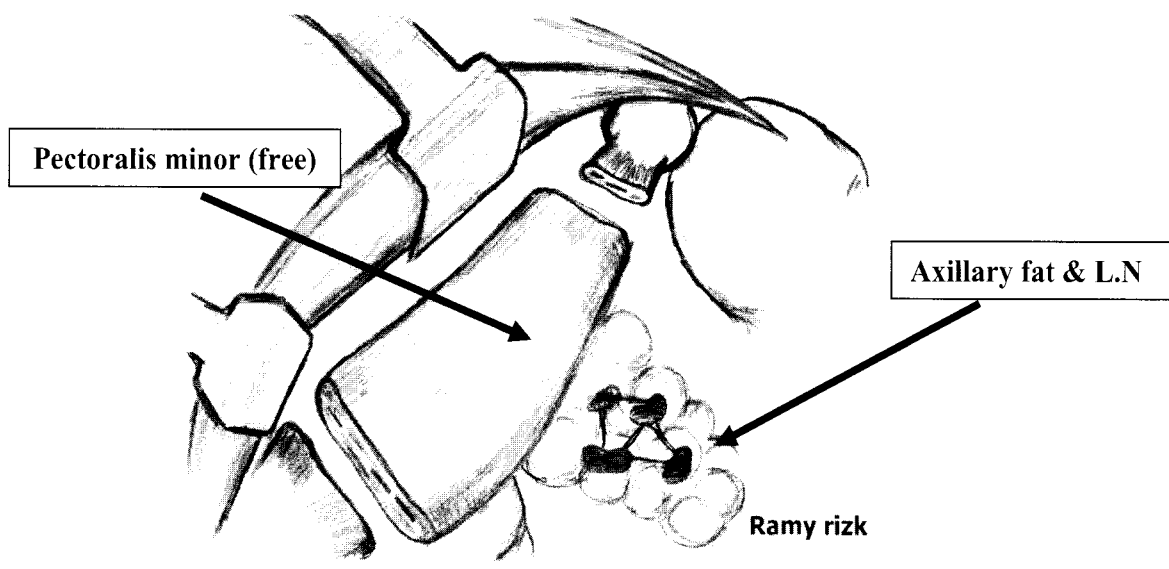
- 1- We do not get behind the subscapular vein to avoid nerve to lat. dorsi injury.
- 2- Nerve to lat. dorsi should be preserved as we may need the lat. dorsi as a myocutaneous flap for reconstruction; if skin necrosis occurs.

Medially = serratus ant (be careful for long thoracic nerve)
 = n. to serratus anterior = n. of Bell



N.B. Injury to n. to serratus anterior leads to winging of the scapula.

- g) Separate the origin of pect. minor from its origin at the chest wall, this will free the specimen.

**Closure:**

- As simple mastectomy.
- A drain is left to avoid lymph collection (= seroma) as lymph vessels may continue to leak for 7-10 days.

V- Complications:

- **Operative:**

- Primary hemorrhage: ttt by controlling the bleeding.
- Injuries: e.g:
 - Axillary vein: repair or ligate if cephalic vein is intact.
 - Nerve to Latissimus dorsi.
 - Nerve to Serratus anterior.

- **Post operative:**

- At area of mastectomy:
 - Seroma: ttt: Aspirate with asepsis.
 - Sloughing of flaps: ttt: debride & use later skin graft.
 - Gangrene.
 - Scar shape (Cosmosis).
- At the arm:
 - Brawny oedema (Lymphoedema).

Maden's modification of Patey's operation:

As Patey's but with retraction of both pectoralis minor and major.

N.B. Structures piercing the clavipectoral fascia:



- Art. = Thoracoacromial.
- Vein = Cephalic v. (if injured → brawny edema).
- Lymphatics.
- Nerve = Lateral pectoral n.

Types Modified Radical Mastectomy:

1. **Patey:** Removal of pectoralis minor → get access to level 3 lymph nodes.
2. **Scanlon:** cut pectoralis minor but not remove it.
3. **Maden:** preserve the pectoralis minor to allow only incomplete removal of level 1 and 2 lymph nodes.

Conservative breast surgery (segmental mastectomy):

1. Indications:

- Tumour 4 cm or less.
- Not multicentric.
- Size of tumour in relation to the size of breast.

2. Contraindication:

- Central tumours.
- Recurrence
- Patient well
- No facilities for radiotherapy.

عكس اللي فات +

3. Position:

- Supine and arm abducted.

4. Incision:

- Curvi linear incision (for tumour)
- Another transverse incision for axillary sampling.

Possible oral questions

- 1-What are Types of breast surgery for cancer breast?
- 2-Triple assessment of breast mass?
- 3-Anatomical landmarks and lymphatic drainage of the breast?
- 4-TNM staging and Manchester classification of breast cancer?
- 5-Indications and contraindications for breast conservative surgery?
- 6-Structures preserved and structures sacrificed in radical mastectomy?
- 7-Reconstructive breast surgery?
- 8-Management and drainage of breast abscess?

► References:

- B. & L. → p.846.
- Dixon and Sainsbury 2nd edition "Churchil Living Stone Edinburg"
- Haris, Lippman, Marrow M., Hellman S. (2000).
- Colour Atlas of Breast Disease "Mosby-Wolf" London.

Operations for Hernia:

Indirect Inguinal Hernia

Herniotomy

= *Reduction of the content + Excision of the sac.*

I- Indications:

- In infants & children with inguinal hernia.
- Before herniorrhaphy in adults.

II- Preoperative preparation:

- Exclude & correct the precipitating factors = ↑ intra abdominal pressure.
 - Stop smoking.
 - Weight reduction.
 - Treatment of resp. tract inf.
 - Treatment of S.E.P. & constipation.
- If the hernia is huge, prepare for postoperative ventilation.

III- Anesthesia: → general / spinal / local anesthesia.

IV- Steps:

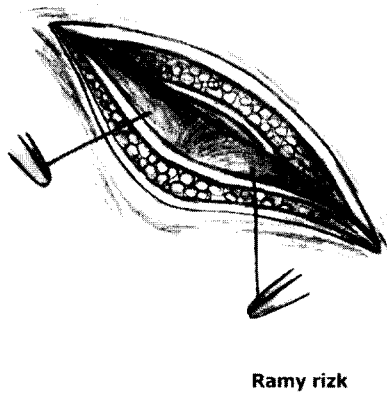
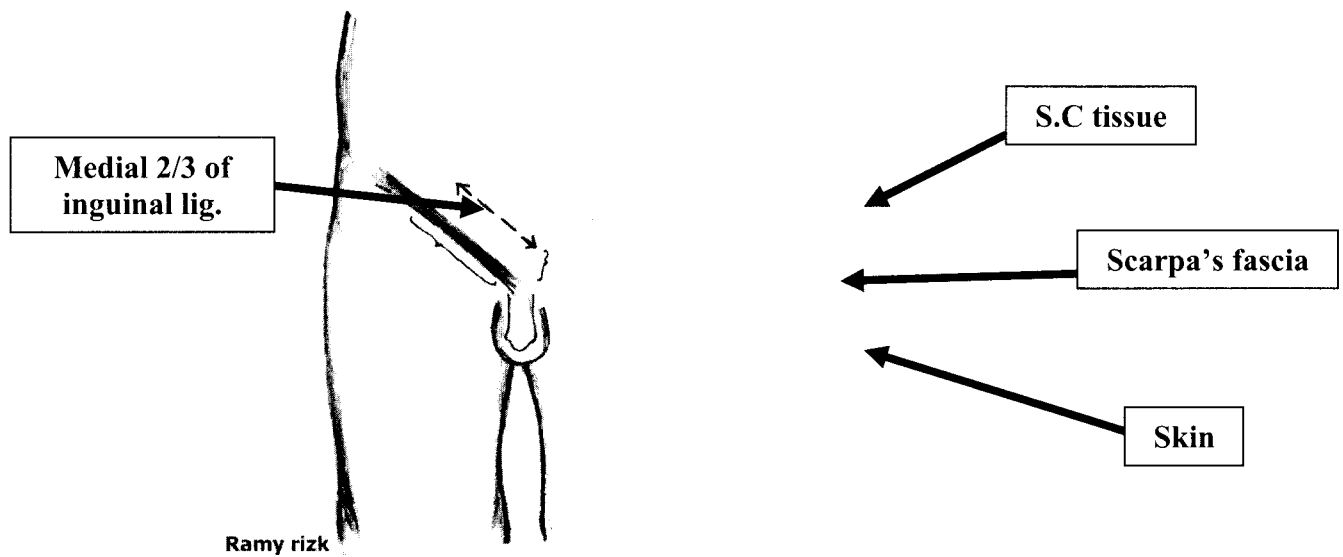
1- Position: → Supine.

2- Skin preparation:

- Betadine from umbilicus to mid-thigh.
- Tincture iodine is **better to be avoided** in the scrotum

2- Incision: (Groin incision)

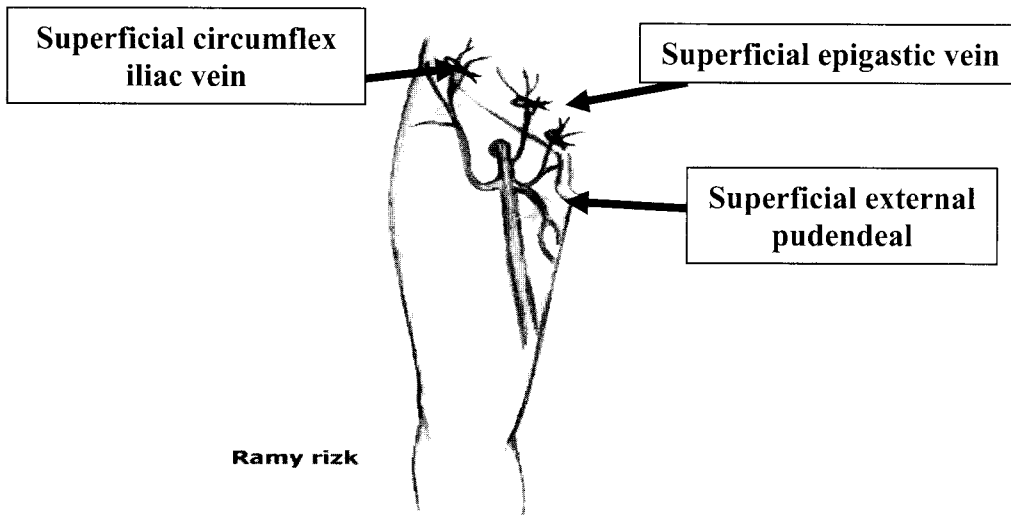
- **Oblique:** 3 cm above & parallel to the medial 2/3 of inguinal ligament. (= from internal to external ring).



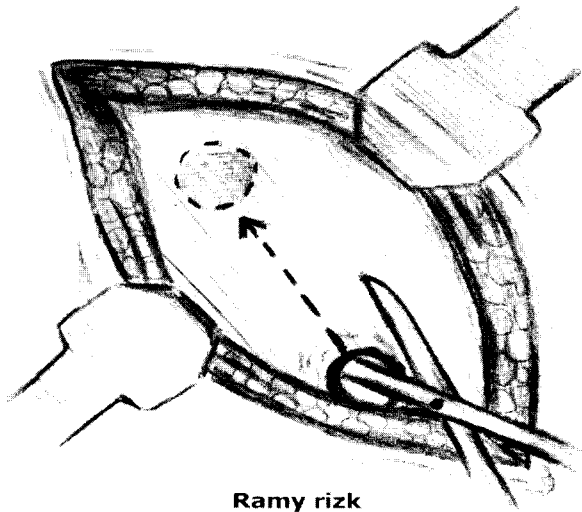
- **Transverse**: along the inguinal skin crease (along Langer's lines = cosmetically better).
- It includes: skin, SC tissue, Scarpa's fascia.

3- Procedure:

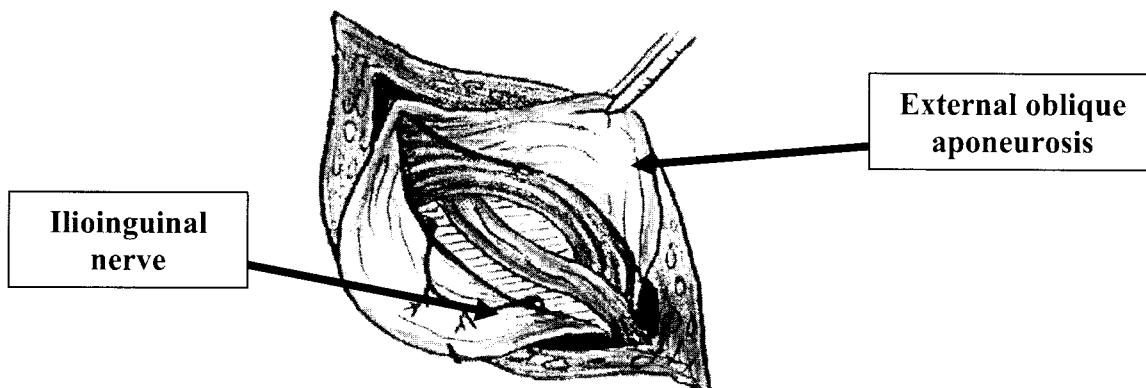
1. **Ligate & divide** the 3 superficial veins.



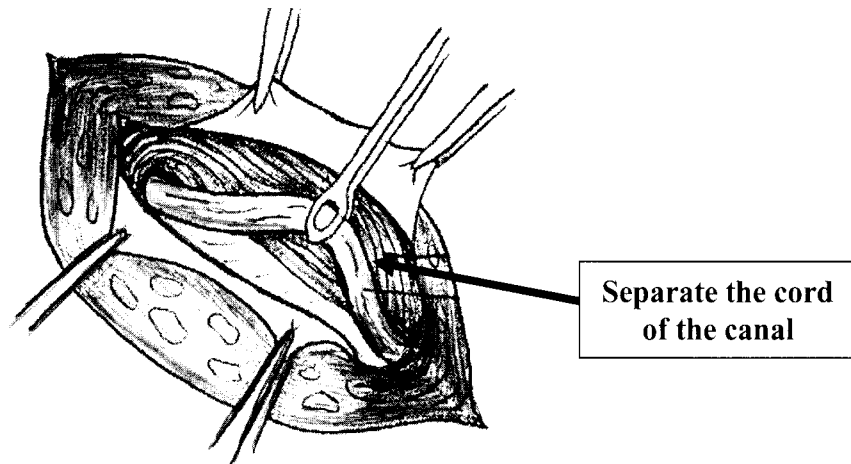
2. **Divide the external oblique aponeurosis** in the direction of its fibers (from the external ring extending laterally till the internal ring & little more).



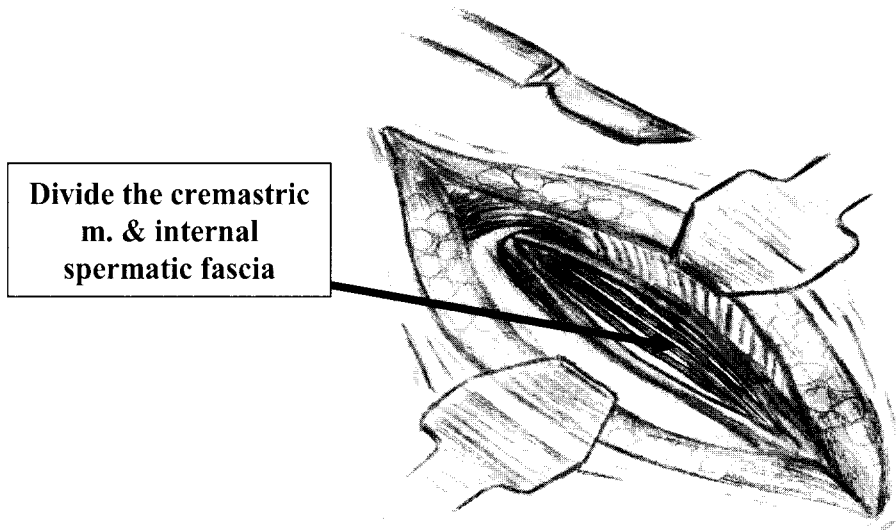
3. **Reflect the external oblique aponeurosis** & identify the ilioinguinal nerve & reflect it over the aponeurosis (injury of the ilioinguinal nerve at this level cause hypoesthesia in the scrotum only without any paralysis)



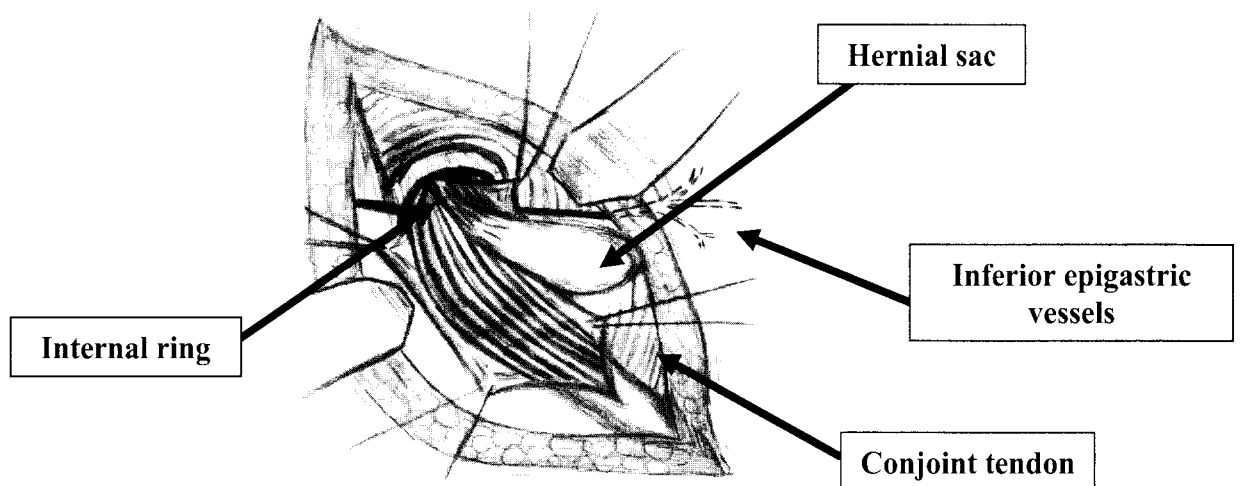
4. **Separate** the cord from the post wall of the canal.



5. **Divide** the cremasteric muscle & internal spermatic fascia.



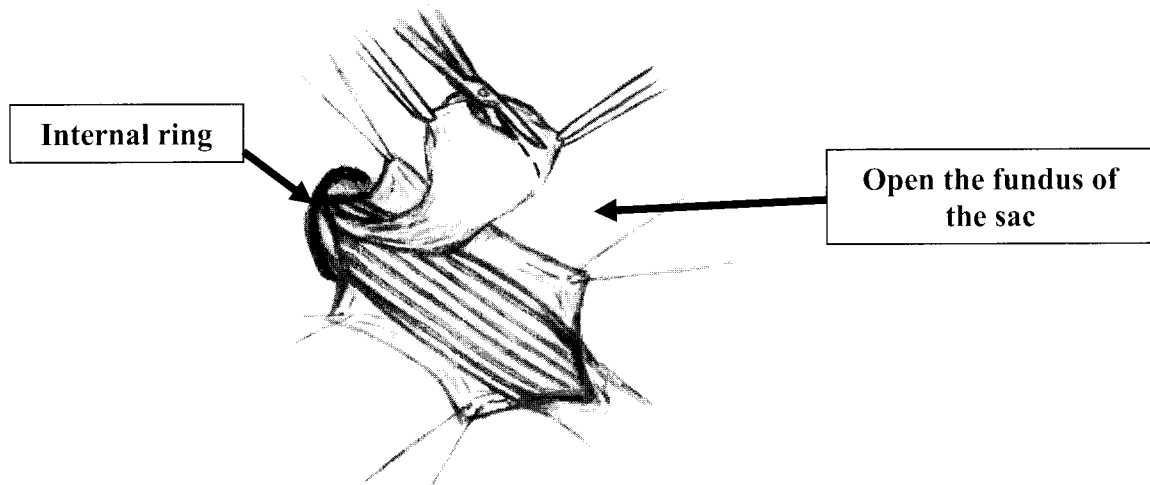
6. **Dissect the sac** (= pearly white in color, anteromedial to the vas).



7. **Dissect** the hernial sac **up to its neck** being known by:

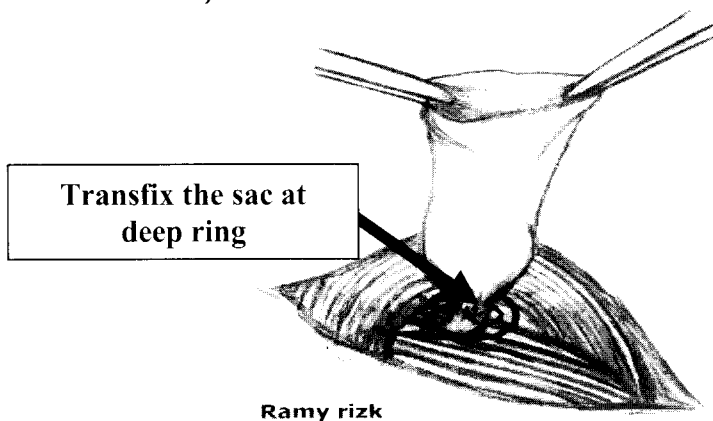
- a- The narrowest part of the sac.
- b- Extra-peritoneal collar of fat.
- c- Inferior epigastric a. is medial to it.

8. Open the fundus of the sac.



9. Reduce the contents.

10. Transfix the sac at the deep ring (after twisting it for several times).



11. Excise the redundant sac.



NB:

1. *Effective transfixation is known by slippage of the neck into abdomen on cutting it.*

If the sac is the processus vaginalis:

- *Reduce the contents.*
- *Divide the sac.*

2. *Transfix the proximal part & excise it leaving the distal part around testis).*

Herniorraphy

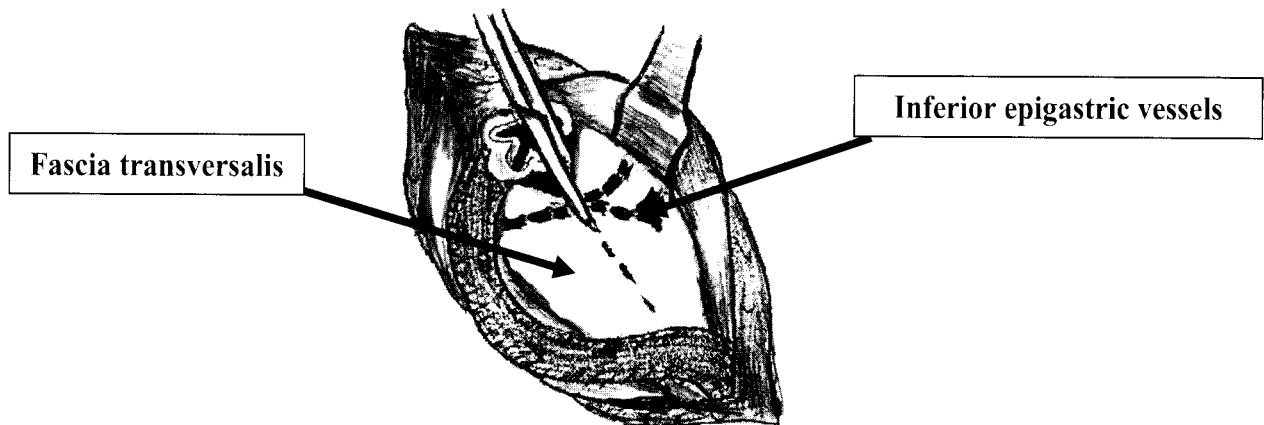
= *Close the defect in the weak canal by suturing*

Indication: → It is the standard operation in adult hernia.

III- IV: → As herniotomy → Then →

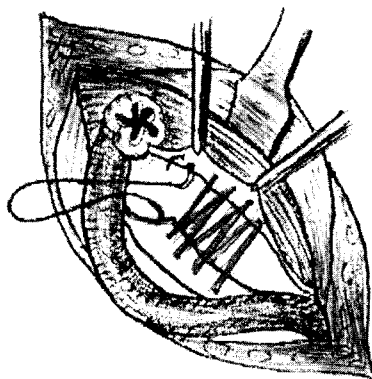
Shouldice's repair = 3 double breasting:

- **Fascia transversalis** is incised along the length of the canal starting from the internal ring to the pubic tubercle.

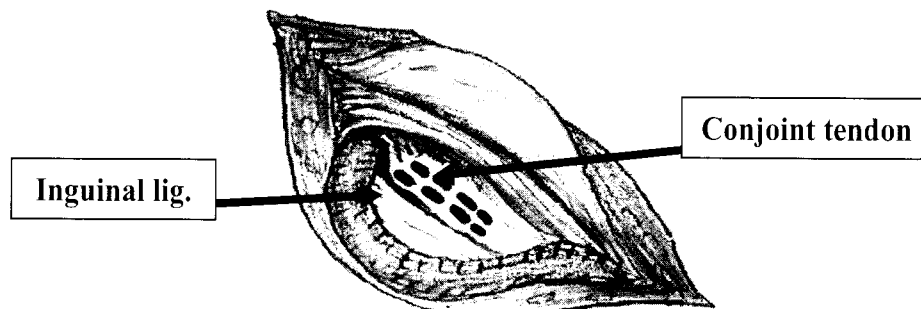


- Then 3 double-breasting is done:

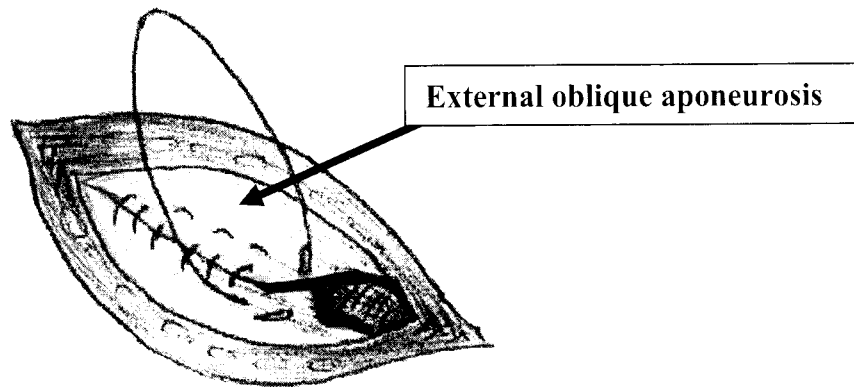
1- Double breasting to the fascia transversalis behind the cord



2- Double breasting of the conjoint tendon to the inguinal ligament behind the cord.

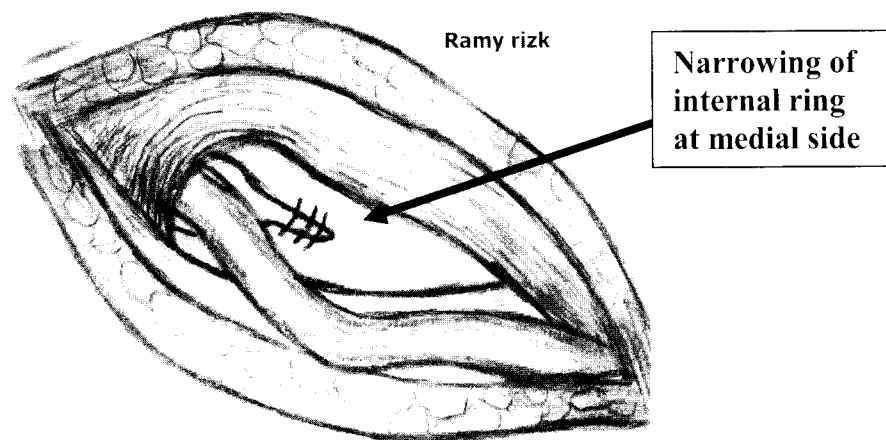


3- Double breasting of the external oblique aponeurosis in front of the cord



Bassini's repair:

- 1- **Narrowing of internal ring** (from medial side as this ↑ distance between internal & external rings = ↑ the canal obliquity which is an antihernial factor.



- 2- ± **Plication of fascia transversalis** (interrupted sutures).
3- **The conjoint tendon is sutured** to the inguinal ligament behind the cord by non absorbable prolene interrupted sutures.



N.B. *The sutures are from the under surface of the conjoint tendon because it's more tendinous.*

- 4- **Close the external oblique aponeurosis** one layer in front of the cord.(as before).
5- **Tanner's releasing incision** is a 5 cm incision in rectus sheath starts at the pubic crest to 2 cm from lateral edge of rectus abdominis muscle which can relief tension on conjoint tendon if present due to Bassini's repair.

Disadvantages:

- Interferes with shuttering mechanism of conjoint tendon.

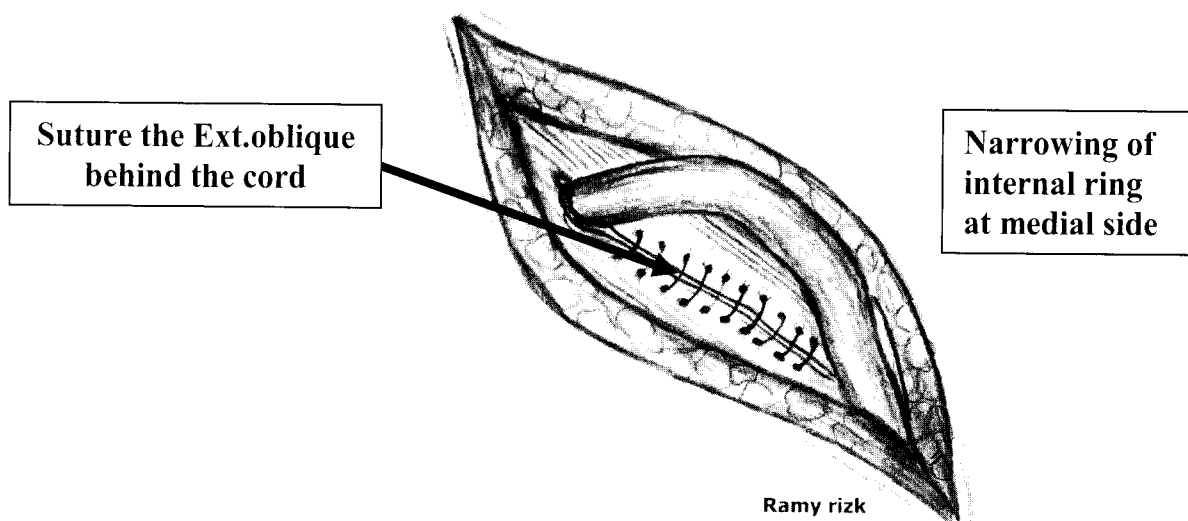
- Bad healing as it involves suturing tendon to tendon, so: we use prolene sutures.
- Tension atrophy of the conjoint tendon.

McVay Repair: (Marcy)

- 1- Narrowing of the internal ring (from the lateral side).
- 2- Suturing of:
 - The thickening in the fascia transversalis below the conjoint tendon (= Transverse aponeurotic arch).
 - To the thickening in the fascia transversalis below the inguinal ligament (= iliopubic tract).

Halsted repair:

Incise the ext oblique aponeurosis & put it behind the cord to strengthen the post wall of the canal.

**Disadvantages:**

- The cord is covered with skin only (= liable to trauma → sterility)
- It is done only for old age.

Hernioplasty

By:

A- Darning.

B- Grafting:

1. Natural.
 - Skin (Obsolete for fear of forming implantation dermoid cyst).
 - Fascia Lata .
2. Synthetic
 - Prolene (better✓✓).
 - Mercilne.
 - PTFE.
 - Marlex.
 - Dacron.
 - Daxon.

Types:

- **Onlay** = in front of fascia transversalis or muscles of the ant. abdominal wall (commonly in use✓✓).
- **Inlay** = In front of the peritoneum.
- **Sublay** = below peritoneum.

Indications:

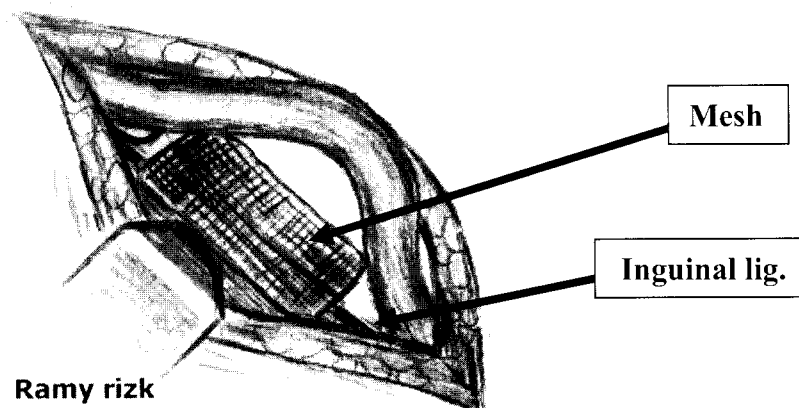
- 1- Very weak abdominal wall.
- 2- Large defect.
- 3- Recurrent hernia.



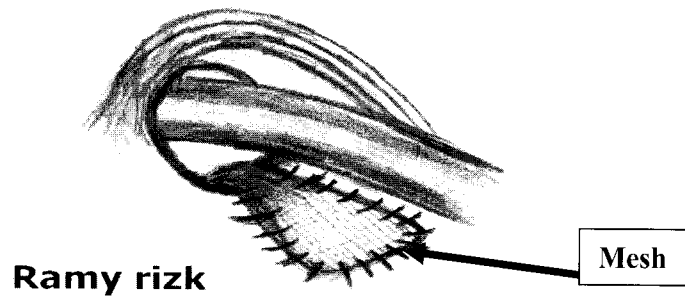
N.B. Contraindicated in strangulated hernia as the field is potentially infected

Technique:**A- Tension free mesh (Leichtenstein):**

- Put a mesh on the post. wall of the inguinal canal → the mesh induces fibrosis (not mechanical pressure).
- The external oblique is closed over the cord.

**B- Mesh plug technique (for small hernia):**

- Push a triangular mesh in the internal ring & suture it.
- The ext oblique is closed over the cord.

**C- Recently:**

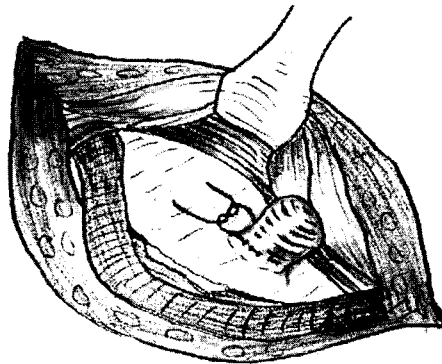
- Double mesh system.
- Laparoscopic repair with mesh: Extra- or Intraperitoneal.
- Preperitoneal approach (Nyhus).
- Trans external ring laparoscopic tension free repair.

**N.B. Inguinal hernia in female:**

- Dissect the sac → transfixation & excision.
- Excision of round ligament.
- Obliteration of posterior wall of the canal.

Direct Inguinal Hernia**Invagination of the sac**

- Apply purse-string.
- Invaginated sac.
- Tighten the purse-string.
- We do tension-free mesh.

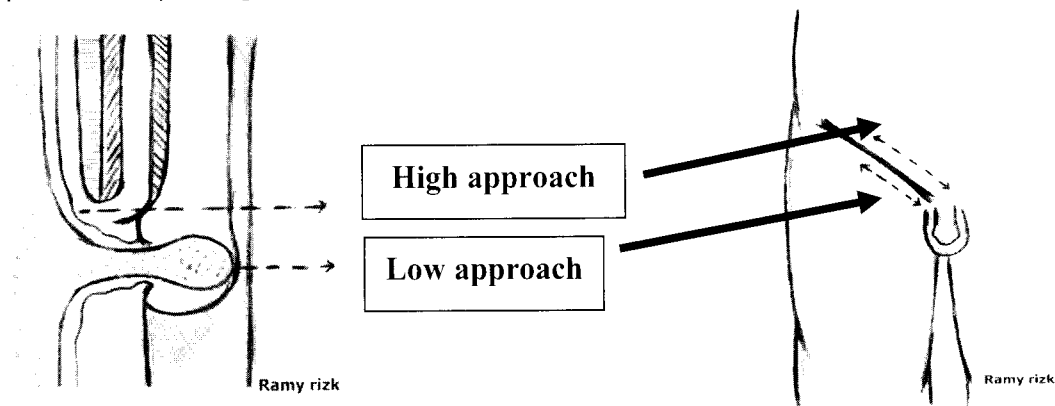
**Hernioplasty**

= *Tension free mesh.*

Femoral Hernia

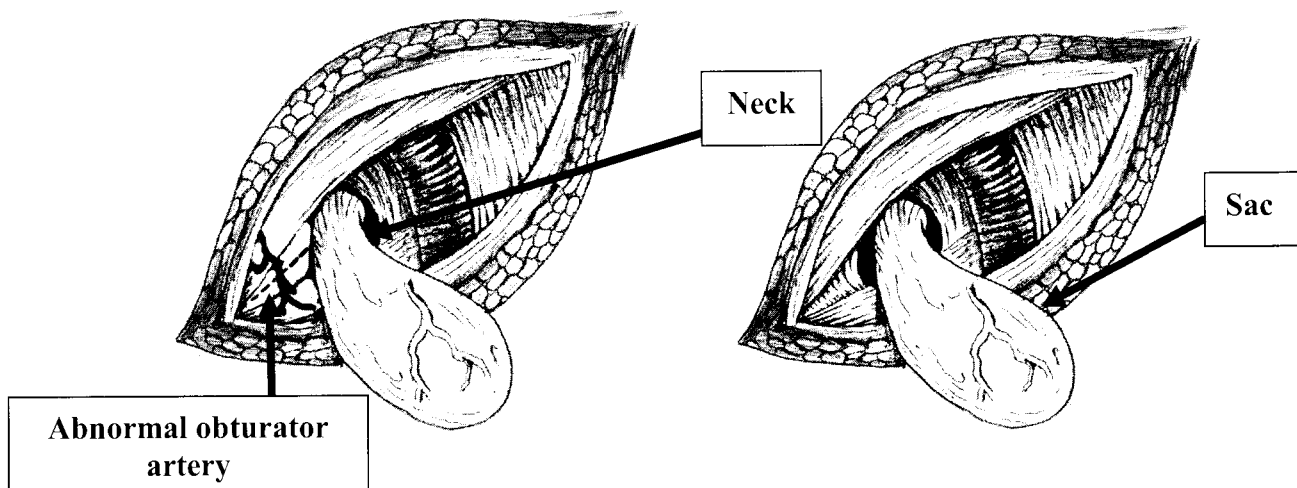
Low approach (Lockwood's)

Incision: → 1 cm below & parallel to the inguinal ligament (medial 3/5) i.e. over saphenous opening.

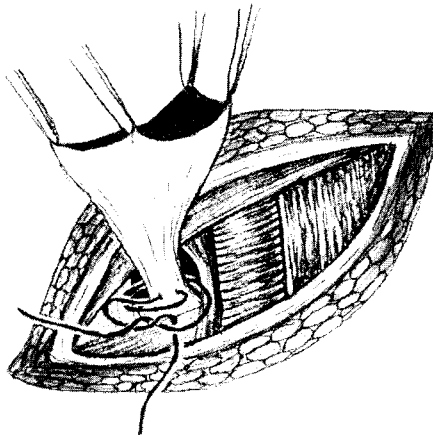


Procedure:

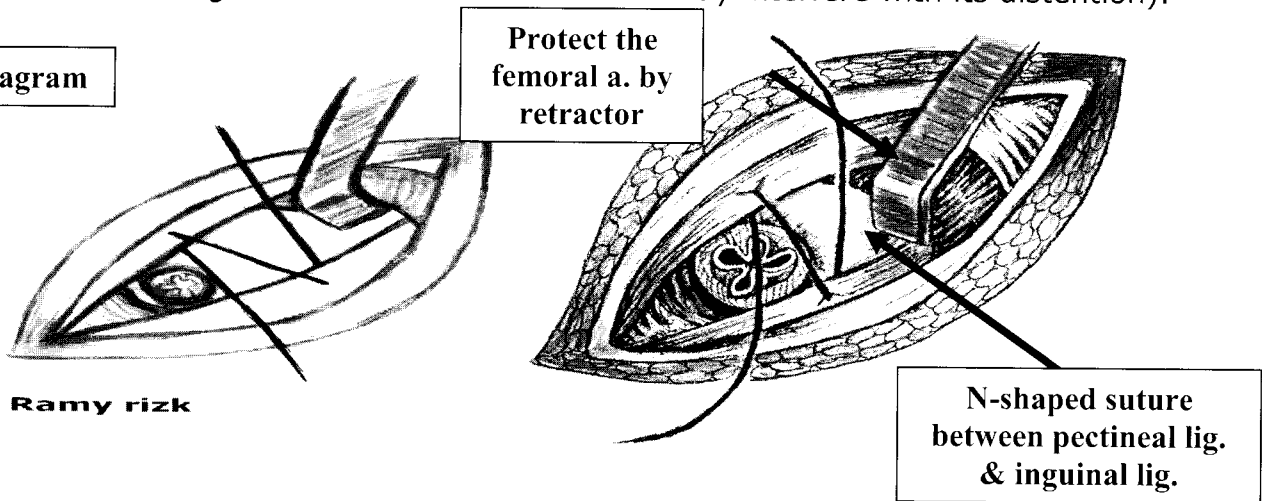
1. Incise the skin, SC tissue, Scarpa's fascia to expose the sac.
2. Expose the sac by gauze dissection up to its neck.



3. Open the sac at the fundus
4. Return the contents to the abdominal cavity.
5. Dissect the neck of the sac away from the margins of the femoral ring.
 - If the defect is narrow, we have to cut the lacunar ligament this injures the abnormal obturator artery.
6. Transfix the sac as high as possible & divide it → = Herniotomy.

**Repair:**

- Place N-shaped sutures between pectineal & inguinal ligaments.
- Protect the femoral v. by a retractor or the assistant finger.
- Avoid narrowing around the femoral v. which may interfere with its distention).

Diagram**Advantages:**

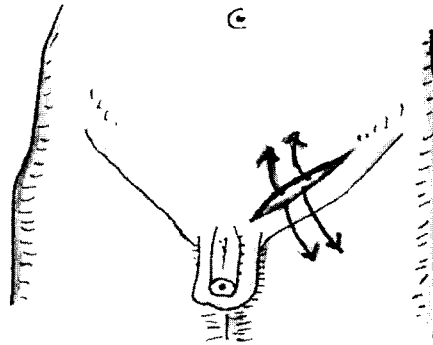
- 1- Direct & rapid approach (easy to reach fundus).
- 2- Inguinal canal is not opened.

Disadvantages:

- 1- Sac may be not completely excised (difficult to reach neck).
- 2- Not suitable for strangulated hernia:
 - Abnormal obturator a. may be injured (during division of constricting ring).
 - Gangrenous loop can't be resected.

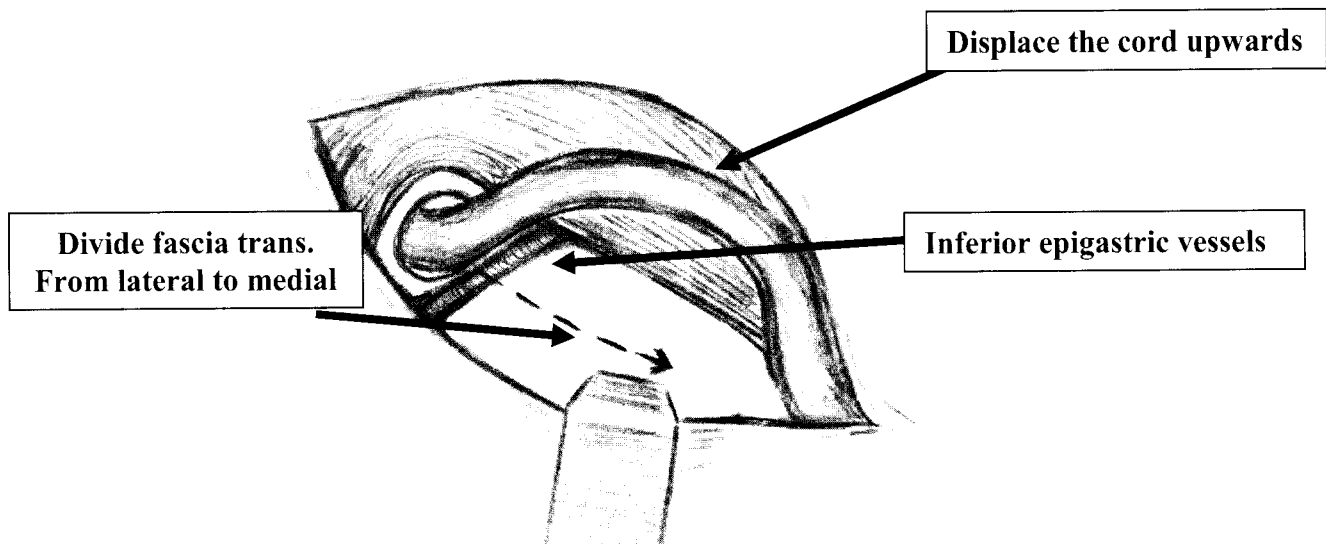
Inguinal approach (Lotheissen's)

Incision: As the inguinal hernia & retract the skin above and below.

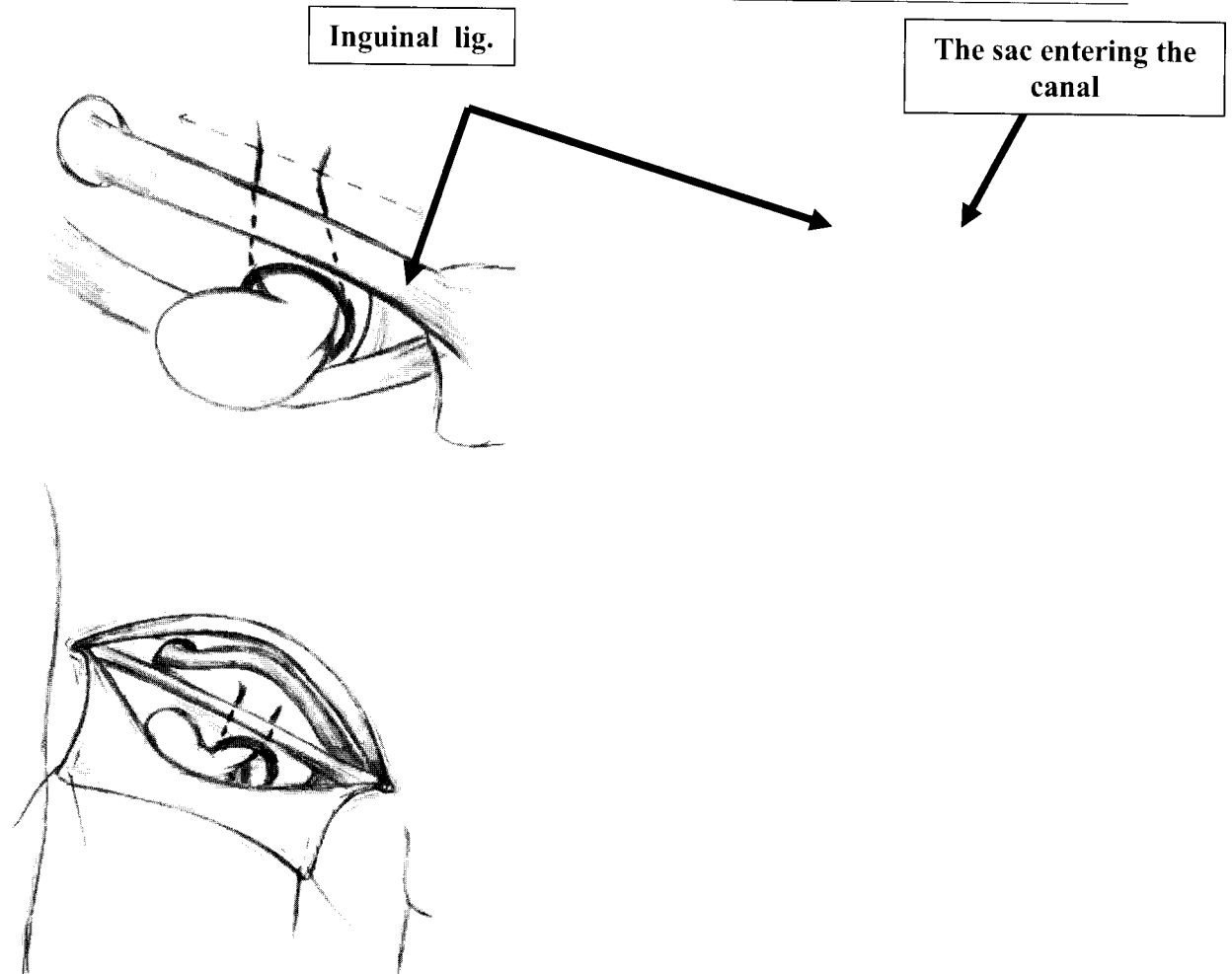


Procedure:

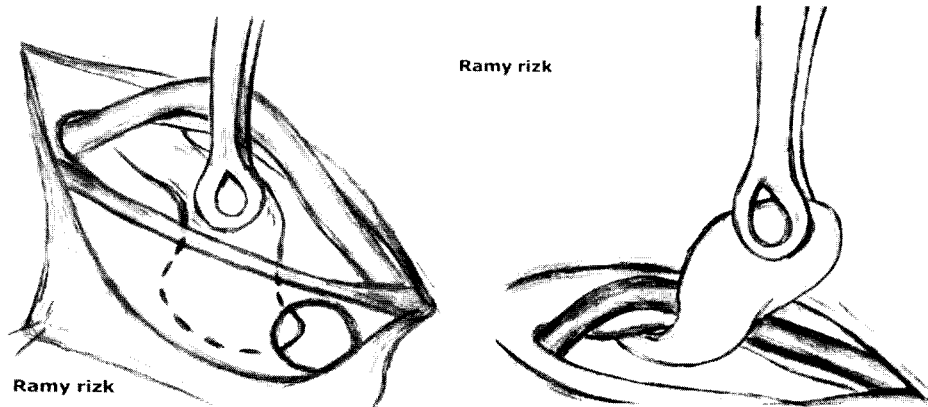
1. After opening the canal displace the cord (or round ligament) upwards
2. Divide the fascia transversalis (from lat. to medial to be aware of the inferior Epigastric vessels at the medial boundaries on the int. ring).



3. Extraperitoneal fat is cleared by gauze dissection until the sac is seen entering the femoral canal.



4. The sac is withdrawn upwards by gentle traction through the incision in the fascia transversalis



5. Reduce the contents.
 6. The neck is transfixed & the sac is cut off
 7. Obliterate the femoral canal by suturing the pectineal lig. with the ing. lig.

☛ **If the hernia is strangulated:**

→ Division of the constricting ring (Lacunar ligament) is done.

Advantages:

1. Sac can be completely excised (easy to reach neck).
2. Suitable for strangulated hernia.
 - Abnormal obturator a. can be visualized & protected (during division of constricting ring).
 - Gangrenous loop can be resected.

Disadvantage: Inguinal canal is opened → may be weakened.

Mc Evedy's

Incision:

- Incise the rectus sheath (lower paramedian incision) & push the rectus ms medially to set access to the inguinal canal from the medial side.

Procedure:

- As high approach but from the medial side.
- The femoral canal is obliterated by suturing pectineal lig with inguinal lig.

Advantage:

- Roomy space.

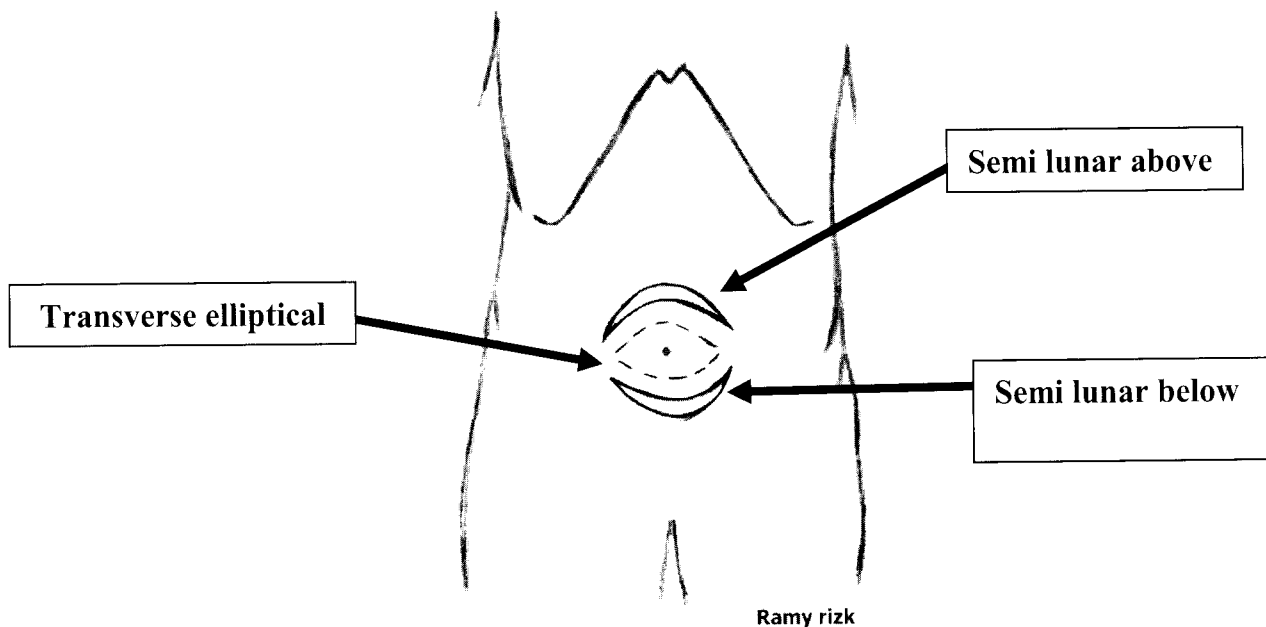
Disadvantage:

- Injury to nerve supply of the rectus m. because it comes from the lateral side → Incisional hernia.

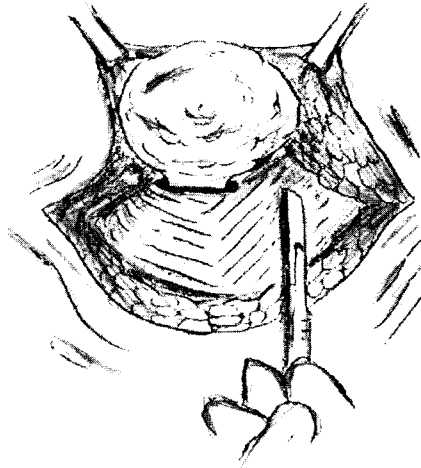
Paraumbilical hernia

Incision:

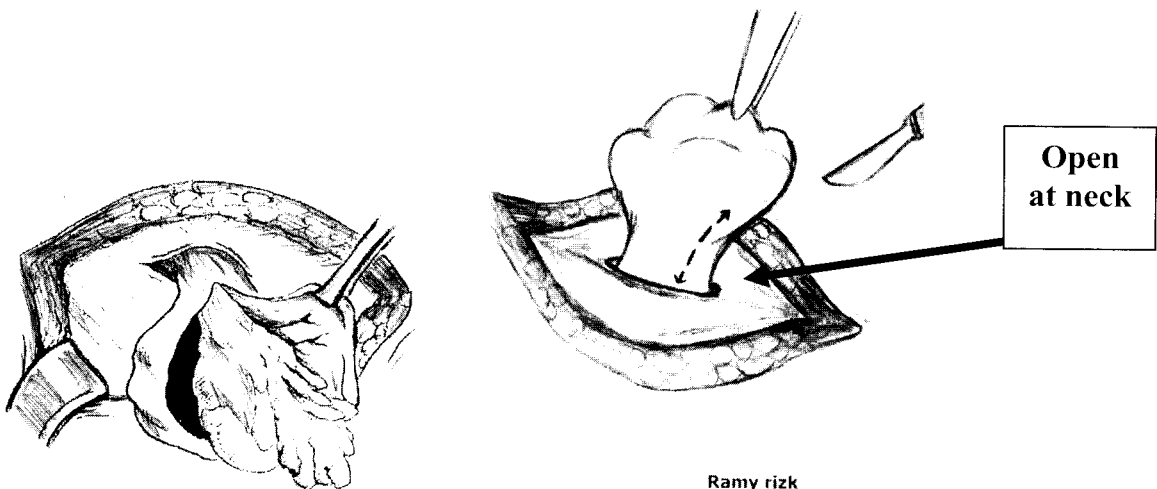
- 1- If above the umbilicus → semilunar incision above it.
- 2- If below the umbilicus → semilunar incision below it.
- 3- If large defect with unhealthy skin → transv. elliptical incision over it.
- 4- Vertical incision may be used especially with divercation of recti.

**General procedure:**

- a- The incision is deepened through the SC fat until the rectus sheath is seen.
- b- Dissect the neck of the sac from all directions by cleaning of fat of surrounding fascia.



- c- Open the sac at its neck: (as the fundus is multiloculated and there are adhesions between the fundus and contents but there are no adhesions at the neck)



Ramy rizk

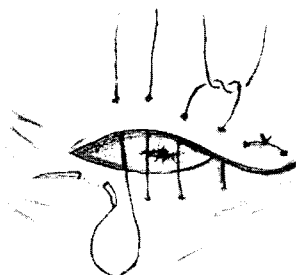
- d- free the contents & Reduce it
e- Excise the sac

A- Mayo's repair:

- a- The defect is enlarged laterally (to the edge of recti) as we try to do ellipse with a ratio 3 : 1



- b- If the defect is rounded dog ears will be formed during closure
c- Double breasting of the aponeurosis can be done (**mattress sutures in such a way that the upper flap becomes over the lower one.**)



- d- Closure with suction drain.

Disadvantages:

- 1- **High tension** on the suture line (on bending backward) with ↑ risk of recurrence.
- 2- Peritoneum of upper flap is in contact with rectus sheath → irritation → exudation & infection.
- 3- Recurrence in 25% of cases.

B- Anatomical repair (Better ✓):

Through the incision we do repair of the linea alba from above downwards including the defect of the hernial sac either by:

a. **Mass closure:** Suturing the upper flap to the lower one as one layer without overlapping.

b. **Layered closure:**

1st layer: Peritoneum & posterior rectus sheath.

2nd layer: Muscles (Hemostatic).

3rd layer: Anterior rectus sheath.

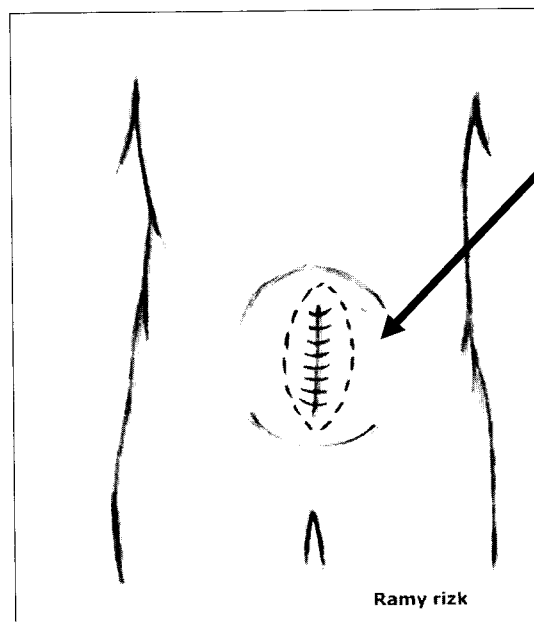
Umbilical Hernia for children

- ***As Mayo's repair.***

- **N.B.:**

- We must do subumbilical incision not supraumbilical because it leaves an ugly scar.
- We have to preserve the umbilicus to avoid psychological disturbances.

Incisional hernia



Elliptical incision to the
old scar

Ramy rizk

Anatomical Repair

Incision: → Ellipse in the skin to excise the old scar.

Procedure:

- a- Dissect the sac till the neck.
- b- Open the sac at the neck.
- c- Perform herniotomy as paraumbilical hernia.
- d- Excise fibrous tissue from all around the defect (freeing of the edge).

Closure: → In separate layers:

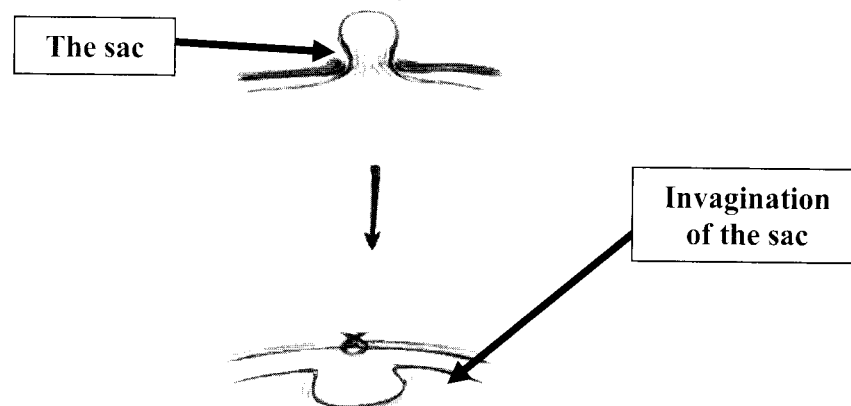
- 1- Peritoneum.
- 2- Int. oblique, transversus abdominis.
- 3- Ext. oblique.

Keel Repair

Incision: → Ellipse in the skin to excise the old scar.

Procedure:

- a- Dissect the sac till the neck.
- b- Invaginate the sac (like a keel).



- c- Close the defect without freeing of the edge.
- d- Close the skin.

Disadvantages:

- Bad healing (so: use prolene sutures).
- There may be adhesions between the sac & contents (→ intestinal obst.).

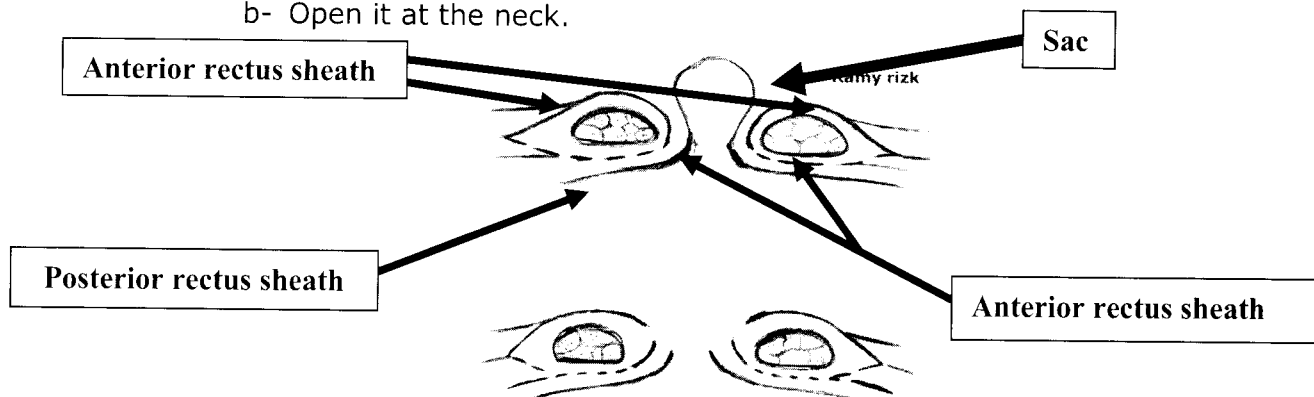
Five layer repair: Cattle's Repair

Indication: → For midline incisional hernia.

Incision: → Ellipse in the skin to excise the scar.

Procedure:

- a- Dissect the sac till the neck.
- b- Open it at the neck.



- c- Perform herniotomy as usual.

d- Repair in five layers:

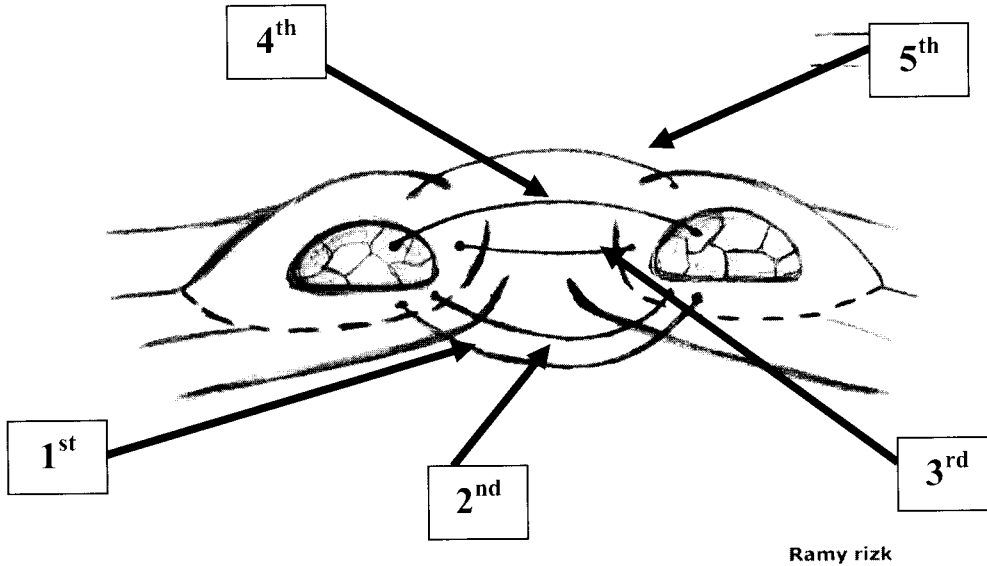
1st: peritoneum & post rectus sheath on both sides.

2nd: peritoneum & post rectus sheath on both sides.

3rd: ant rectus sheath on both sides then push inwards.

4th: rectus ms on both sides.

5th: ant rectus sheath on both sides in front of the rectus ms.



Possible oral questions

- 1- Types of hernia(external and internal hernia)
- 2- Differences between viable and non-viable intestine
- 3- Management of strangulated hernia
- 4- Anatomy of :abdominal wall,inguinal canal,femoral canal ,hasselbach's triangle
- 5- Rare types of external hernia
- 6- What is meant by :pantaloon hernia ,sliding hernia,Richter's hernia ,Littre's hernia,maydl's hernia
- 7- Complications of truss
- 8- How can you identify the sac and neck of the sac??
- 9- What are types of repair you know?
- 10- Advantages and disadvantages of:
Low and high approach of femoral hernia
- 11- How can you repair umbilical and incisional hernia

► References:

- B. & L. → 73 P.1273.
- Delvin, B. and Kingsnorth (98) 2nd edition, Arnold, London.
- Nyhus, L.M. and Condon (2001) 5th edition, Philadelphia.

Abdominal incisions

Requirements:

Requirements of a satisfactory abdominal incisions are:

- Accessibility: The incision should provide good exposure of the diseased area
- Extendibility: If needed, it should be possible to enlarge the incision to give more exposure.
- Safety: The incision should inflict the minimal damage to muscles, blood vessels & nerves (Muscle splitting more preferred than muscle cutting)
- Good cosmetic result: Transverse suprapubic incision is better looking than a low midline incision

Types:

Abdominal incisions may be vertical, transverse or oblique:

- **Vertical incisions**: Midline, Paramedian incisions (Any may be upper or lower)
- **Transverse incisions**: Transverse epigastric, pfannenstiel incisions
- **Oblique incisions**: Subcostal, McBurney's incisions

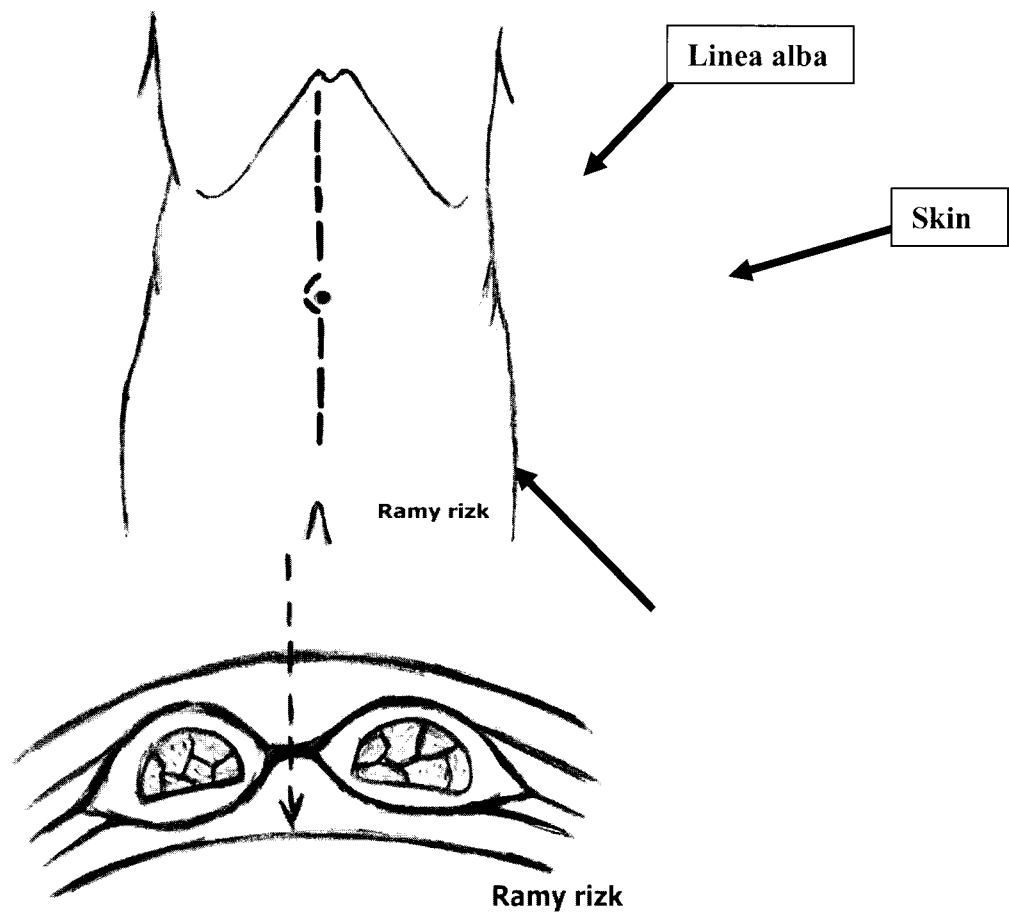
Midline Incision

Indications:

→ Emergency.

Incision:

- Skin.
- Superficial Fascia.
- Linea alba.
- Peritoneum.



Advantages:

- Rapid.
- Exploratory.
- Less bleeding.

Peritoneum

Disadvantages:

- Weakening of linea alba → bad healing, hernia (but less to occur because of non-absorbable prolene sutures).
- Bad cosmesis.

Paramedian Incision

1. Upper paramedian: (from xiphisternum above till below the umblicus)

2. Lower paramedian: (from symphysis pubis below till above the umblicus)

Incision:

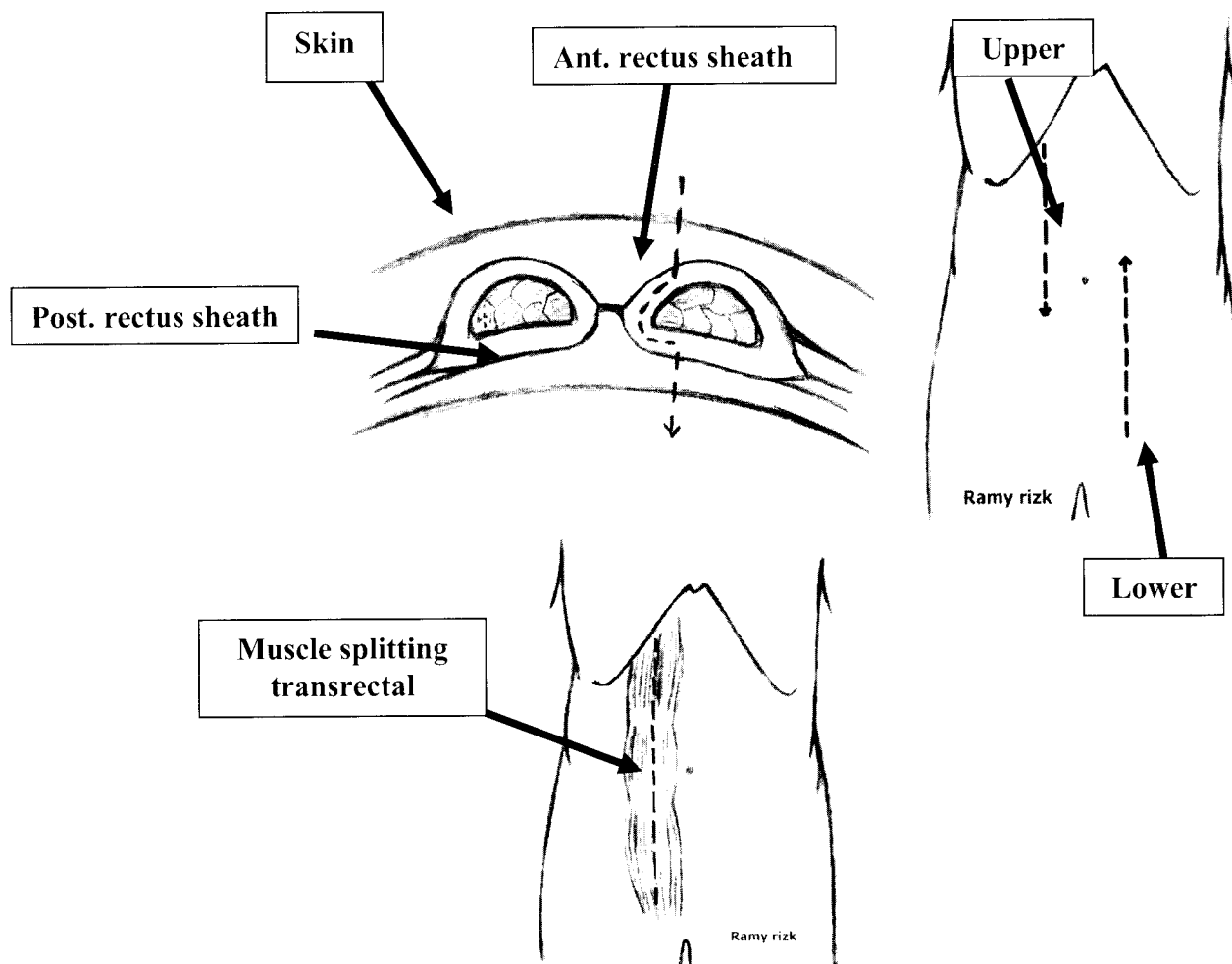
- Skin.
- Superficial fascia.
- Ant rectus sheath.
- Retract the rectus m. laterally (nerve supply comes from lateral side).
- Posterior rectus sheath (absent in lower paramedian incision).
- Peritoneum.

N.B. We can cut rectus muscle longitudinally instead of retracting it laterally; this is called "Muscle cutting transrectal"



Disadvantages:

The medial part becomes devitalized due to cutting of both nerve & blood supply.



Closure:

- Peritoneum, post. & ant. rectus sheath are closed by prolene.
- S.C. → chromic.
- Skin → silk.
- Peritoneum, post rectus sheath → continuous sutures.
- Ant. rectus sheath → interrupted sutures.

Advantages:

- Low incidence of incisional hernia.
- Exploratory.

Disadvantages:

- Not passing with Langer's lines.
- Time consuming than midline.
- More bleeding than midline.

**Subcostal incision
(if in Rt. side = kocher)****Indications of kocher incision:**

- Sure diagnosis of chronic calculous cholecystitis with no other associated lesions (as Saint's or Wilkie's triad).
- Wide subcostal angle.
- Lt. Subcostal incision for splenectomy.

Incision:

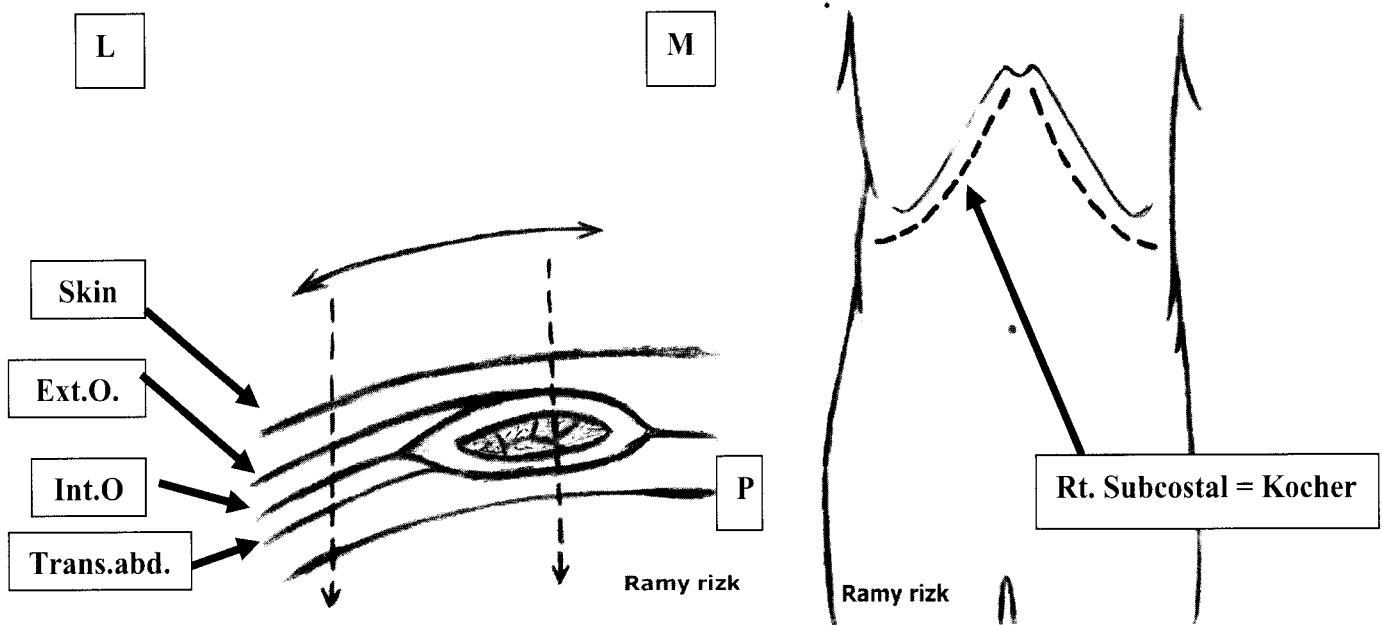
- Skin.
- S.C.
- Then:

Medially:

- Ant rectus sheath.
- Rectus m.
- post rectus sheath.
- Peritoneum.

laterally:

- External oblique m.
- Internal oblique. m.
- Transversus abdominus m.
- Peritoneum.



NB: The 8th, 9th, 10th intercostal nerves, are found running downward & medially between int. oblique & transv. abd. So it is better to preserve them. (if cut > 2 nerves → paralysis)

Closure:

in 3 layers

medially:

- Peritoneum.
- Post rectus sheath.
- Ant rectus sheath.
- Skin.

laterally:

- Peritoneum.
- Internal oblique & transv. abd. with post. rectus sheath.
- Ext. oblique with ant rectus sheath.
- Skin.

NB: DO NOT suture the rectus muscle

Advantages:

- Cosmetically better.
- The liver supports the incision if on the right side.
- Direct access (e.g. to gall bladder)

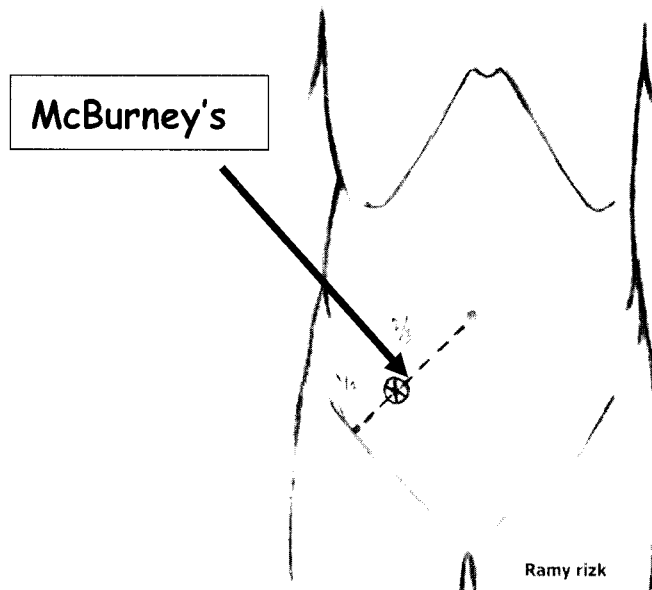
Disadvantages:

- More bleeding (= blood loss).
- Injury to 8, 9, 10th nerves (= nerve loss).
- Time consuming (= time loss).
- Not exploratory.

Grid-iron incision

Incision:

- It is 5-7 cm in length centered over McBurney's point (= base of the appendix).



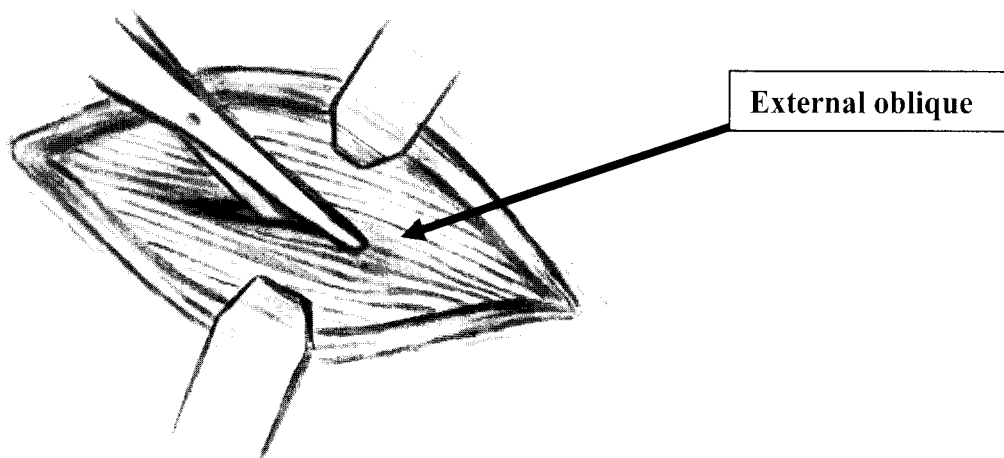
a- open skin, subcutaneous tissue, & Scarpa's fascia

N.B:

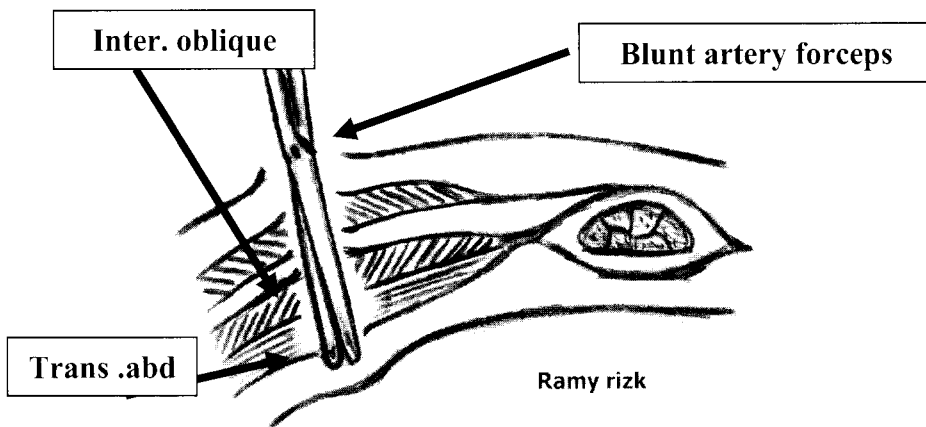
1. Superficial circumflex iliac vessels should be ligated if they are injured, as their injury may lead to haematoma around the penis, scrotum, perineum, or ant. abd wall post operatively)
2. Superf. Circumflex → artery → from the femoral
→ vein → to the saphenous



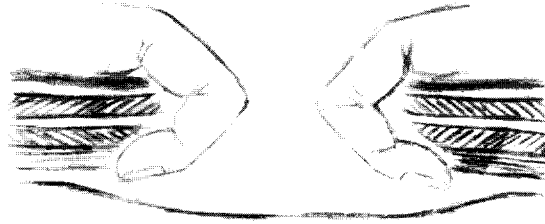
b- Split ext oblique aponeurosis in line of its fibers



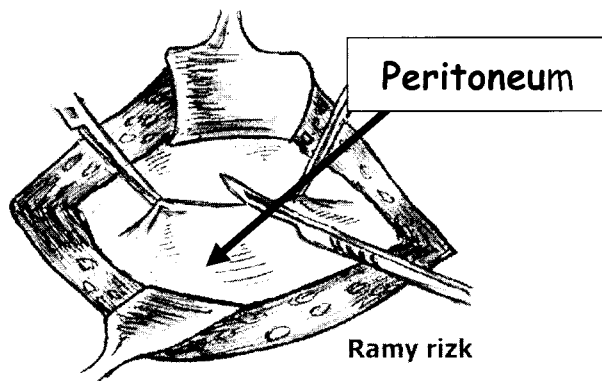
- c- **Split internal oblique & transversus abdominus** with blunt artery forceps (as they are adherent to each other) till the resistance gives away.



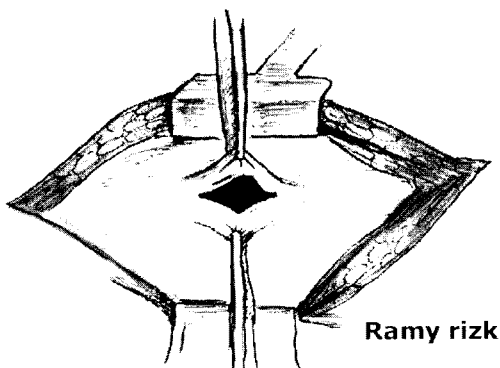
- d- **Peel the peritoneum** from transversus abdominus (to enable us to stitch it as a separate layer during closure)



- e- **Elevate** the peritoneum with 2 non toothed forceps, squeeze it between 2 fingers to be sure that there is no viscera & incise the peritoneum (blade is directed upward to avoid injury of caecum)



Allow access
of air by small
incision





N.B. The peritoneum is opened first by a small incision to allow access of air to help displacement of viscera downwards & therefore decreases the incidence of injury of these viscera while the peritoneum is opened widely

Advantages:

- 1- Muscle splitting decreases incidence of incisional hernia.
- 2- Direct access to appendix.
- 3- Heals rapidly.

Disadvantages:

1. Direct hernia due to injury of the ilioinguinal nerve.
2. Not exploratory.
3. Its extension (Rutherford Morison's) → muscle cutting.

Lanz incision

Indications:

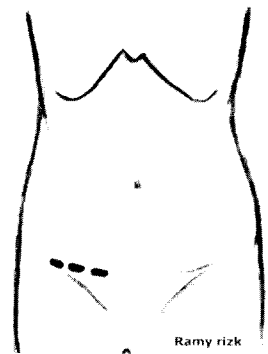
→ Done when cosmosis is highly indicated (e.g. in children).

Incision:

- A transverse incision in the interspinous crease between both ASIS.
- Then grid-iron for the other layers.

Advantages: → More cosmetic.

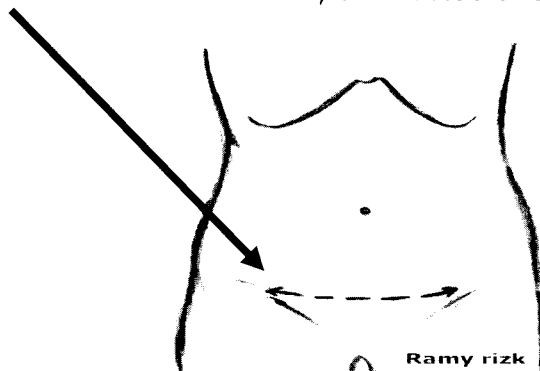
Disadvantage: → Difficult access.



Pfannenstiel incision (= transverse lower abd incision)

Incision:

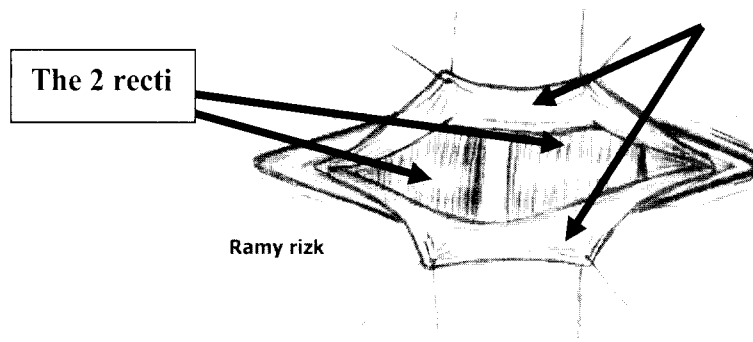
1. A transverse incision of skin, ant rectus sheath on both sides.



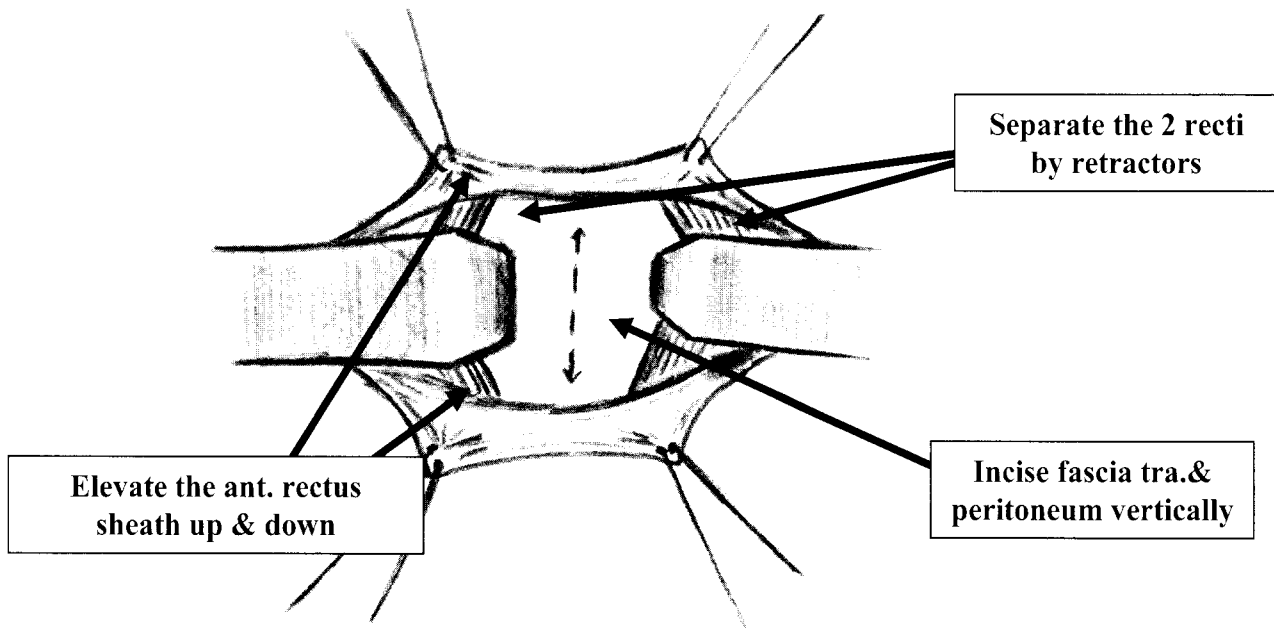
2. **Dissect** the ant rectus sheath from the underlying recti.

3. Then **elevate** it upwards & downwards.

Anterior rectus sheath



4. The recti are **widely separated** apart by retractors or fingers (no post rectus sheath).
5. **Incise** fascia transversalis & peritoneum in a vertical direction.



N.B. For exposure of urinary bladder: fascia transv. & peritoneum are not opened but swept upwards.

possible oral questions

- 1- -indications, structures incised, advantages and disadvantages of:
 - midline incision
 - Paramedian incision
 - subcostal incision
 - grid-iron incision
 - Lanz incision
 - Pfannenstiel incision
- 2- -healing by primary and secondary incision
- 3- -complications of abdominal incision
- 4- -Burst abdomen: causes and management

Appendicectomy

Indications:

- 1- Acute non-complicated appendicitis. (commonest indication)
- 2- After resolution of appendicular mass by 3 months
- 3- After drainage of appendicular abscess by 6 months
- 4- Recurrent subacute appendicitis.
- 5- Chronic appendicitis
- 6- Appendicular tumor (Argentaffin cell tumor) Carcinoid tumor.
 - If less than 1.5 cm → Appendicectomy is always done.
 - If more than 1.5 cm → Rt. Hemoicolectomy is done.
- 7- Others → mucocele, diverticulæ & fistula of appendix.

Contraindications:

- Appendicular mass. ttt: (Oschner-Sherren Regimen).
- Appendicular abscess. ttt: (Extra-peritoneal drainage).
- Crohn's disease affecting the coecum.

N.B.

Prophylactic parenteral antibiotics are used:

- Started one hr. before the operation
- May be continued after the operation for a variable time depending on the severity of appendicitis & presence of peritonitis
- For uncomplicated cases one preoperative dose and another given 6 hrs. are sufficient. "Perioperative antibiotic prophylaxis"
- We use a combination against anaerobes & gram -ve bacilli

Anesthesia

- **General anesthesia.**
- **Spinal if there is bad general condition**, as omental or peritoneal traction is painful.
- **Local.**



N.B.

***1st steps is, examination under anesthesia (relaxation of abdominal muscles)
If mass is found → awaken the patient & start Oschner Sherren treatment.***

Steps:

1- **Position** → supine.

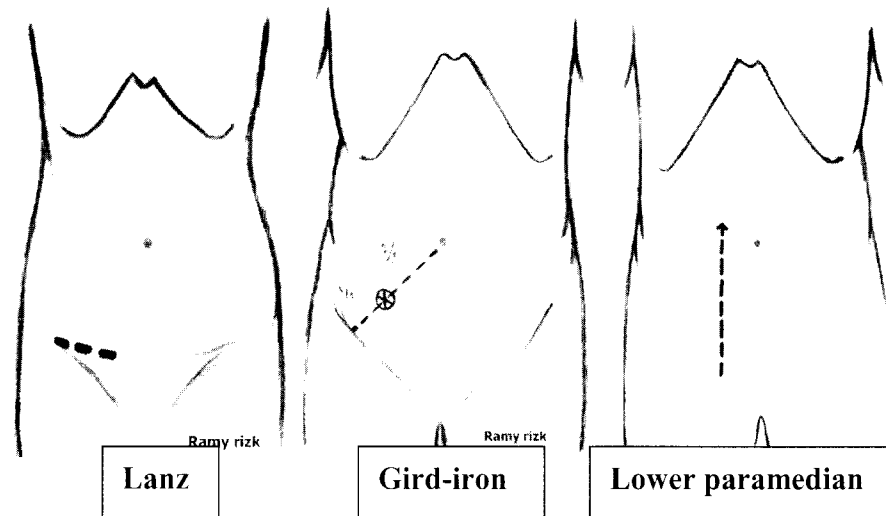
2- Skin preparation:

→ Betadine from umbilicus to mid-thigh.

→ Tincture iodine is **better to be avoided** in the scrotum

2- Incisions:

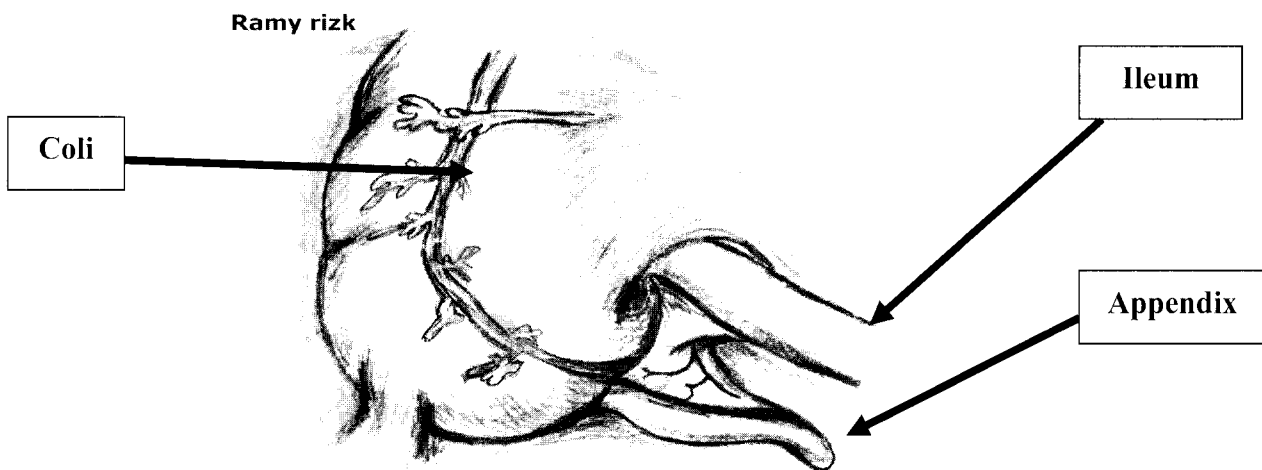
- Grid-iron incision (most commonly used).
- Lanz incision.
- Lower Rt paramedian (if peritonitis or doubtful diagnosis).



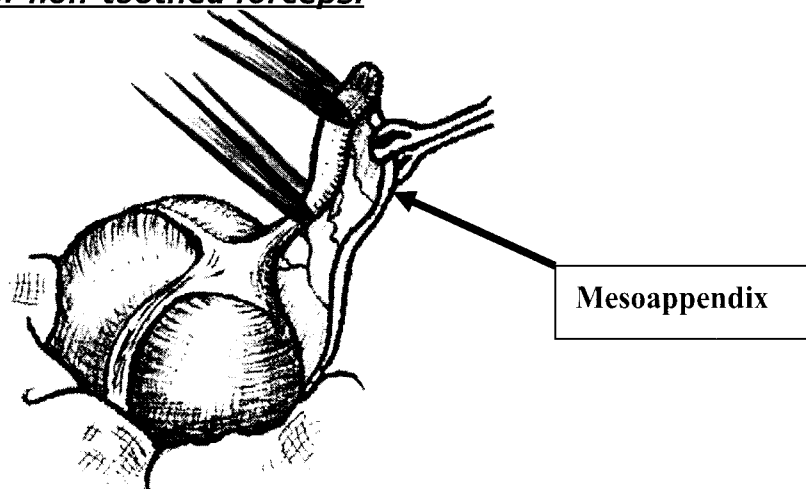
3- Procedure:

1) Identify the coecum =

- Has taenia coli in its wall.
- Blind.
- Faint blue in color.
- Fixed in its place ($\neq$ The crowding small intestine).



2) Deliver the coecum gently into the wound by finger, gauze or non-toothed forceps.

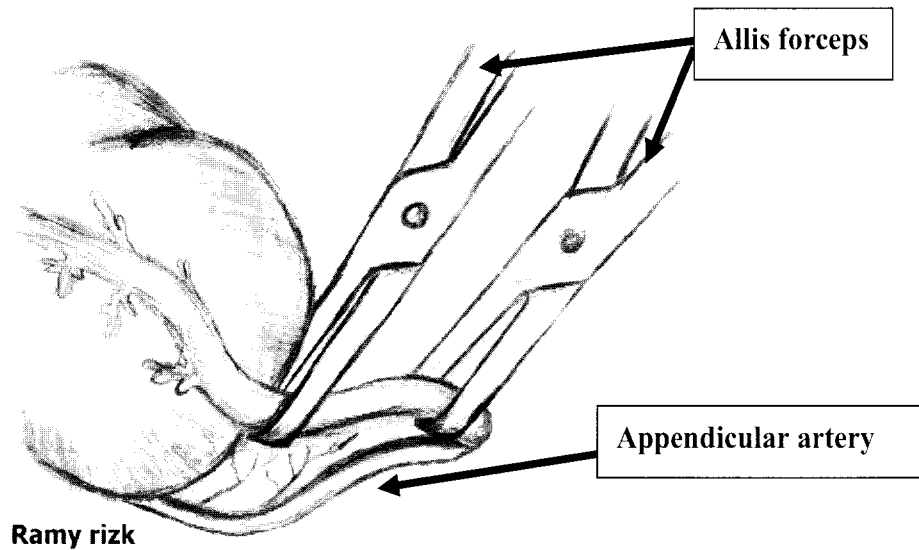
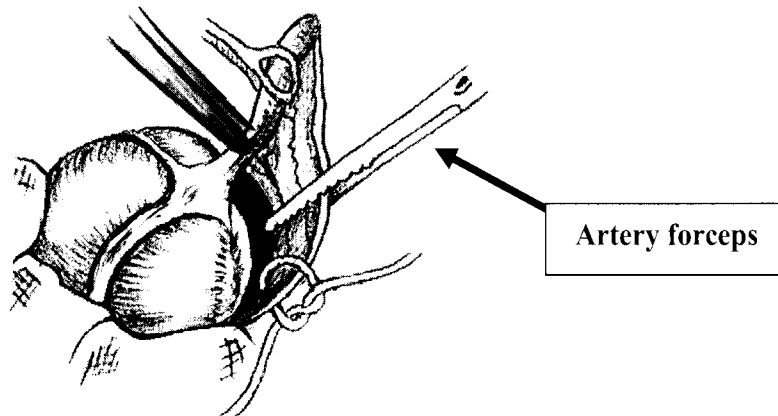


3) Identify the appendix =

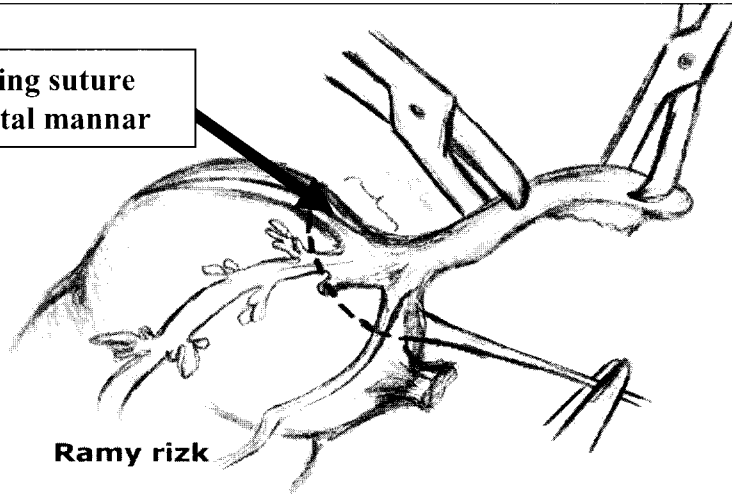
- Follow the taenia coli convergence towards the appendix.
- The base is at 2.5 cm from iliocaecal junction.

N.B. Signs of inflamed appendix:

- 1- Peritoneal reaction (serous fluid or pus).
- 2- Presence of omentum at the wound.

4) Hold the appendix by 2 Allis forceps:**5) Place artery forceps across the mesoappendix:****6) Ligate the vessels:****7) Divide the mesoappendix:**

Purse-string suture
In horizontal mannar



8) Place a purse-string suture at the base of the coecum:

- 2 cm from the base of the appendix.
- In the Tinea coli (because it is avascular).
- In horizontal manner not vertical.
(= seromuscular not reaching the mucosa)

9) Place crushing (Kocher) forceps at the base of the appendix 3 times:

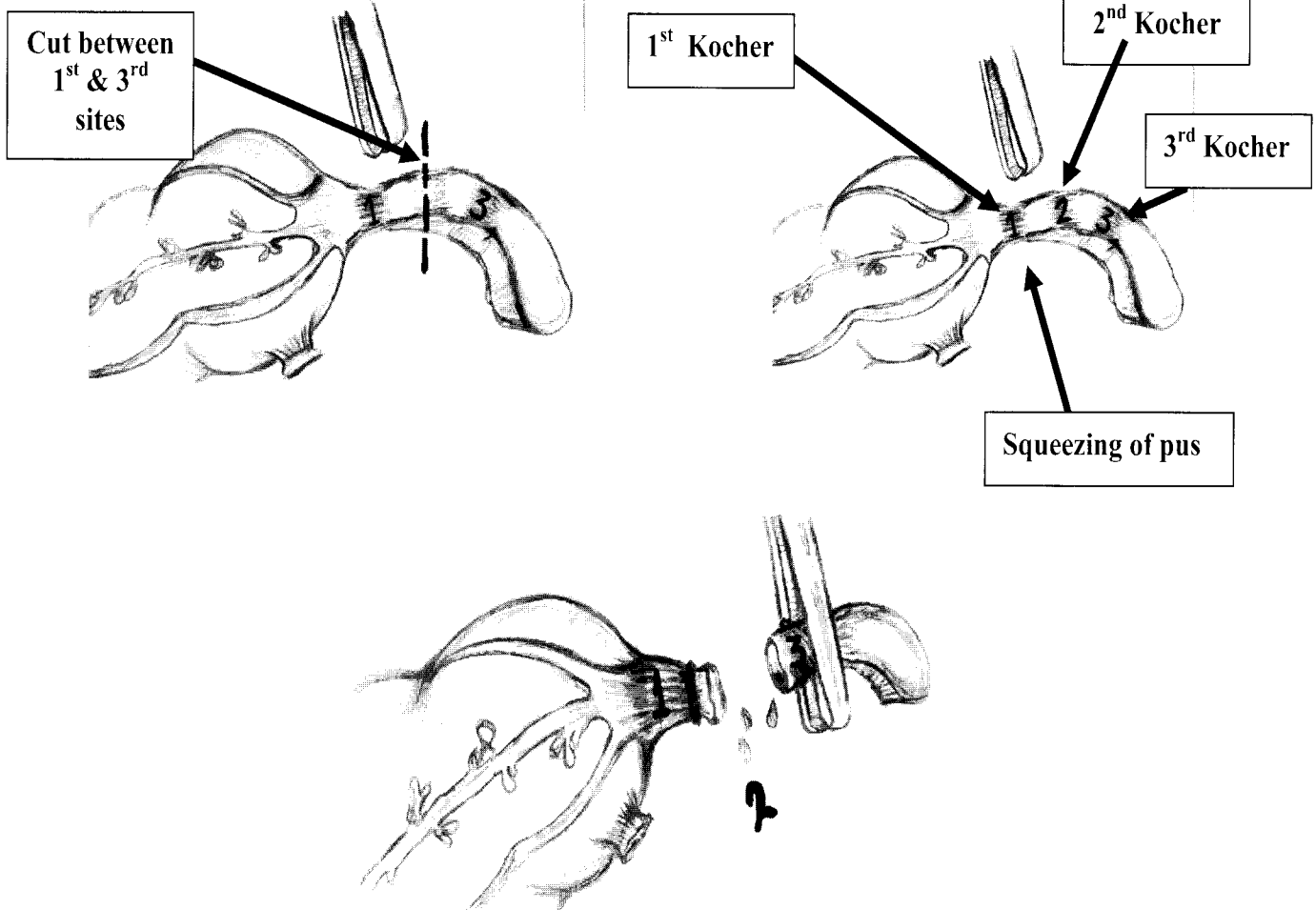
1st (at the base) is for :

- a- Holding ligature at the base with an absorbable ligature.
- b- Hemostatic (obliteration of caecal branches).
- c- Crushing lymphoid follicles.

2nd is for:

- a- Squeezing pus & feces distally (↓ contamination).
- b- Dividing on it.

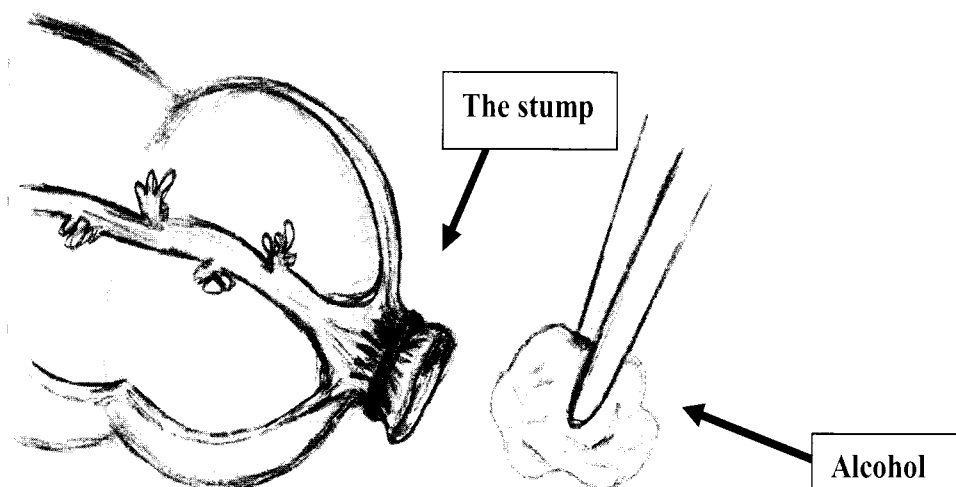
3rd is for leaving the forceps at it so as not to drop pus.

**NB: Crushing:**

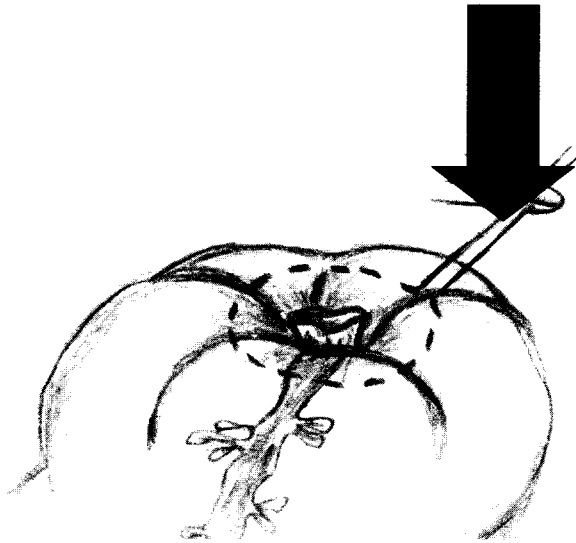
- Promote haemostasis.
- Speeds fibrosis.
- Causes more fixation of the ligature.

10) Send appendix for histopathology (as may be = carcinoid tumor)

11) Paint the stump with alcohol (or cauterize it as it may contain pus)



12) Invaginate the stump in the caecum & tie the purse string around it:



13) Peritoneal toilet for 2 minutes:

(as there may be bleeding from the appendicular vessels).

Problems:

1- The appendix is not inflamed:

- We should do appendicectomy inspite of normal appendix to exclude it later on from the DD of pain in Rt. iliac fossa.
- Search for the cause.

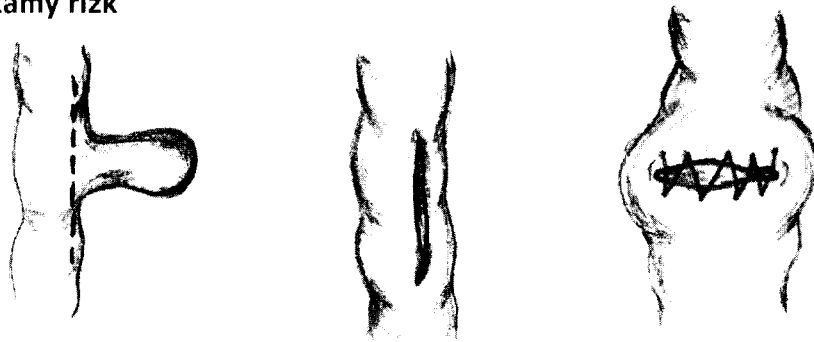
a- Rt tubo-ovarian pathology

(e.g. ruptured ovarian cyst or disturbed ectopic pregnancy).

b- Inflamed Meckel's diverticulum:

- Localized resection from the base + close in a transverse manner. Or:
- Resection & anastomosis.

Ramy rizk



c- Perforated peptic ulcer :

- Upper midline incision.
- Put a drain from the incision of the appendicectomy.

d- Crohn's disease

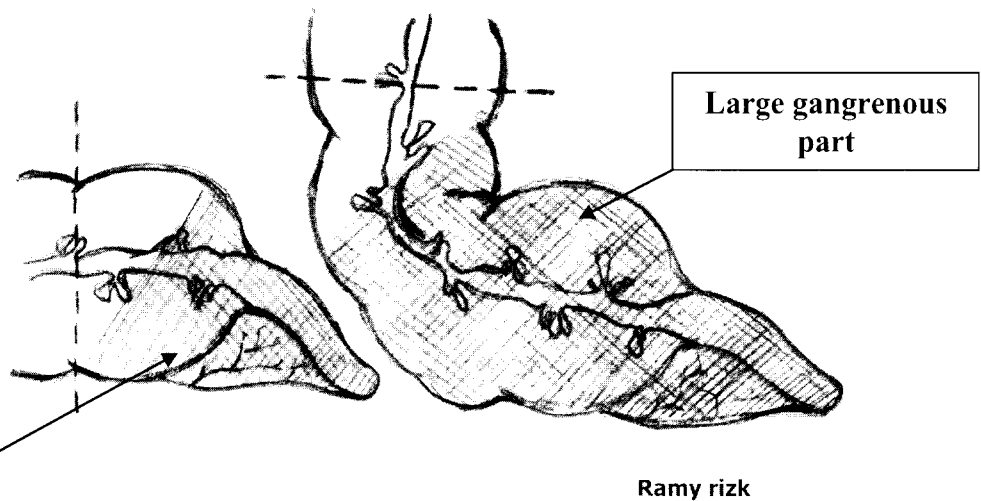
- If inflamed terminal ileum only → appendicectomy.
- If affecting the caecum → contraindicated to do append. (To avoid fecal fistula).



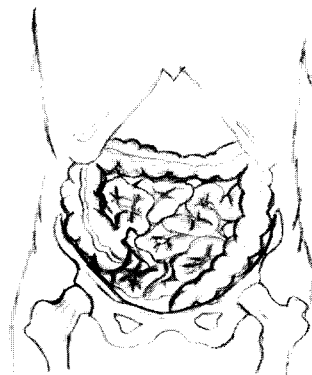
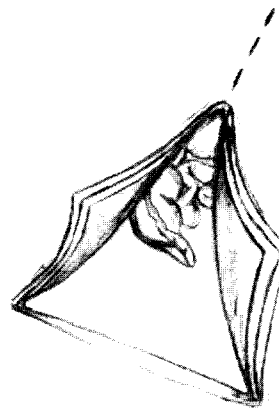
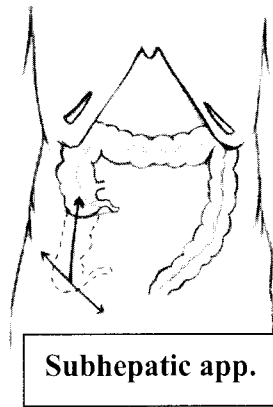
N.B. *If we accidentally find a normal Meckel's diverticulum by the way:*

- young pt → Remove
- Old pt → Leave & give report

- 2- **The appendicular base is markedly inflamed:**
→ Don't do crushing.
- 3- **coecum is inflamed (typhlitis)** → Omit purse string suture
- 4- **The coecum is gangrenous:**
 - **if small part** is gangrenous: remove the gangrenous part + close in 2 layers.
 - **if large part** is gangrenous: limited Rt hemicolectomy .

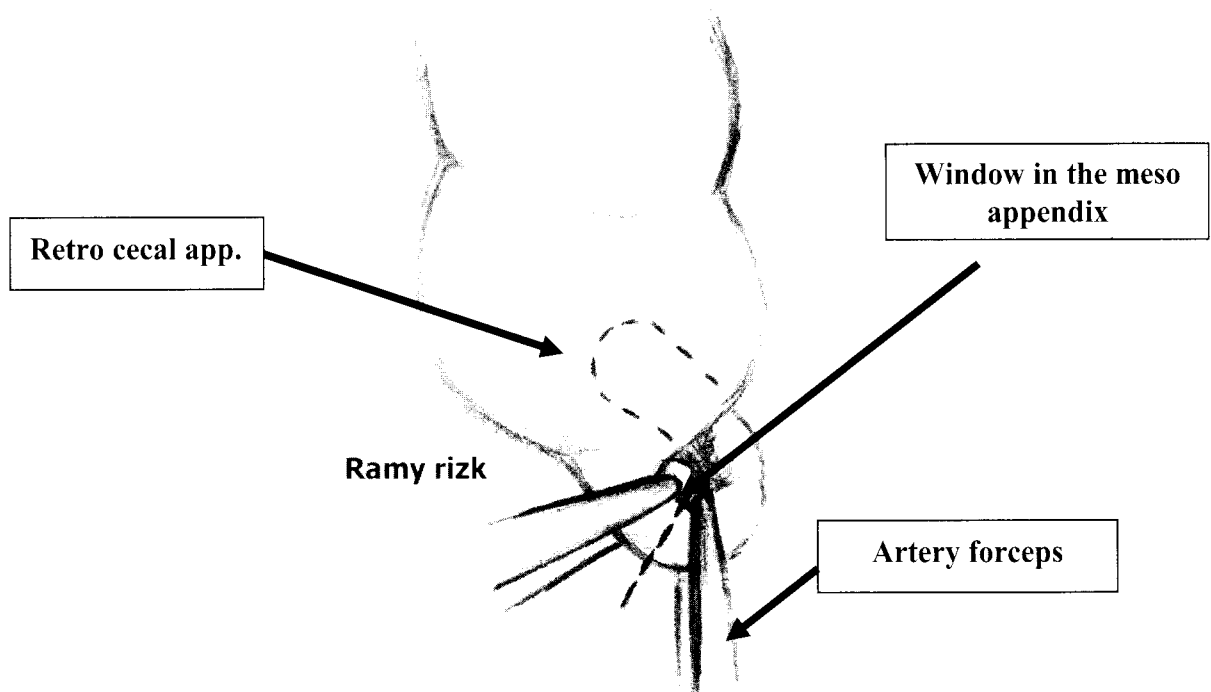


- 5- **If the iliac fossa is empty = subhepatic appendix**
→ Muscle cutting incision, ***rectus abdominis muscle cutting Ratherford muscle cutting extension***

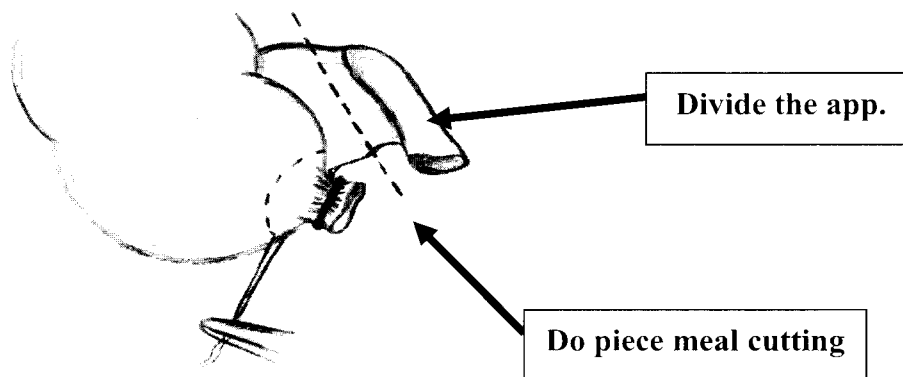


N.B. We avoid injury of deep circumflex iliac artery (from ext. iliac artery) & of ilioinguinal nerve

- 6- **If the tip of the appendix is not accessible ?**
(Base is more accessible than tip)(e.g. Retrocecal appendix).



- Apply 2 artery forceps to the base of the appendix through a window in the mesoappendix (5 mm apart).
- Divide the appendix between the 2 art forceps:



- Ligate the base & do purse string & invaginate the stump.
- Do piece meal cutting of the mesoappendix from base to tip. (Retrograde appendicectomy).

Complications:

Early:

- Paralytic ileus (The most common).
- Infection: peritonitis – wound – pelvic or subphrenic abscess.
- Hemorrhage (1ry haemorrhage from mesoappendix).
- Portal pyaemia.
- Faecal fistula: either due to misdiagnosis, caecal wall necrosis or iatrogenic.

Late:

- Adhesions (small intestine obstruction).

Post operative treatment:

1. Observe vital data: passage of flatus or audible intestinal sounds.
2. Analgesics: Narcotics.
3. Fluids: 500cc glucose/ 6hrs, 500cc Ringer/ 8hrs, 500cc Saline/ 24hrs.
4. Antibiotics: especially with gangrenous appendix, peritonitis or anaerobic infections. Give combination of: Penicillin (for G+ve), Aminoglycosides (for G-ve) & Flagyl (for anaerobs).
5. Remove the drain (if present), when stops draining.
6. Remove stitches after 7 – 10 days.

Possible oral questions

- 1- Complications of acute appendicitis , why it is common in infants and old people
- 2- Typical and atypical presentations of acute appendicitis
- 3- How to manage :appendicular mass , appendicular abscess??
- 4- Different positions of appendix
- 5- Importance of examination under anaesthesia?
- 6- Advantages and disadvantages of: grid iron incision, rt lower paramedian incision
- 7- How to identify cecum, appendix
- 8- Importance of cruching the base of the appendix by 3 kocher forceps
- 9- What will you do if:
 - The appendix is not inflamed
 - Caecum is inflamed

► References:

- B. & L. → 70 : 1208.
- Anderson, Kallehave (2002) (<http://www.cochrane.org>)
- Berry, J. and Malt, american journal of surgery 2000 (567:75).
- Blomquist, P.G, Anderson, Annals of Surgery 233:455-60.
- Rothvock, S.G and Pagane J.P (2000), Annals of Emergency Medicine 36:39-51

Gallbladder Operations

Cholecystectomy

* Types:

Conventional (open), Mini.Lap. (Transrectal) or Laparoscopic.

Open Cholecystectomy

I- Indications:

- 1- **Chronic calcular cholecystitis or C.C.C. (the most common).**
- 2- **Gall stones :**
 - a- **Symptommatized.**
 - b- **Non symptommatized if :**
 - * **> 2 cm** * **Diabetic**
 - * **Non functioning G.B.** * **calcified G.B.**
- 3- **Acute calcular cholecystitis:**
 - During first 3 days with experienced surgeon.
 - 6 weeks after resolution of the acute attack.
- 4- **Chronic non-calcular cholecystitis after failure of the medical Treatment** & the gall bladder is non functioning.
- 5- **Empyema & Mucocele** of the gall bladder (complicating C.C.C.).
- 6- **Torsion, Traumatic perforation, Tumors.**
- 7- **Volvolus G.B. (with mesentry).**
- 8- **Typhoid carrier in G.B.**
- 9- **Operable carcinoma in G.B. (With wedge live resection).**
- 10- **Cholesterolosis of G.B.**

II- Contraindication:

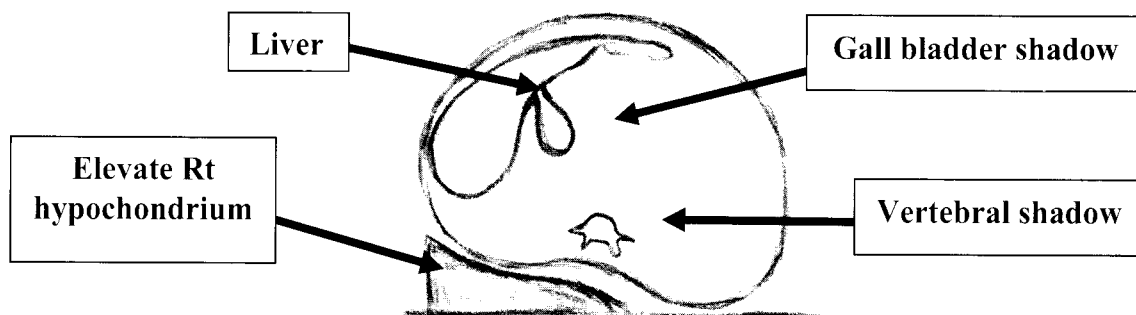
Acute cholecystitis.

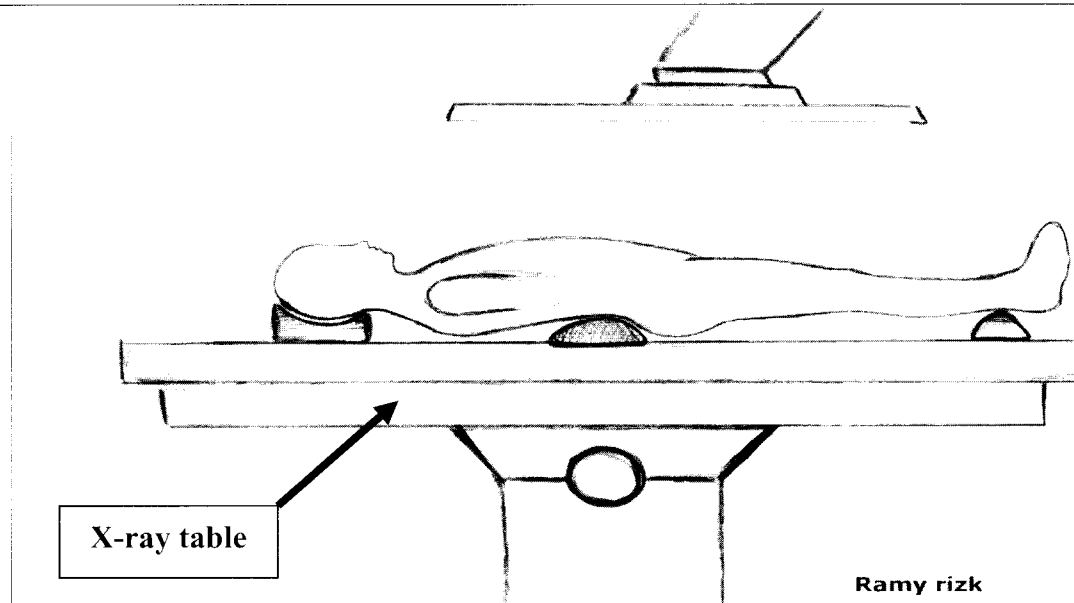
III- Anesthesia: → General anesthesia.

IV- Steps:

1- Position:

- Supine.
- On an X-ray operating table.
- Elevate the Rt hypochondrium 15° [to avoid overlapping of the dye in the GB (white) with the vertebrae (white) during performing cholangiogram.





2- Skin preparation:

3- Incision:

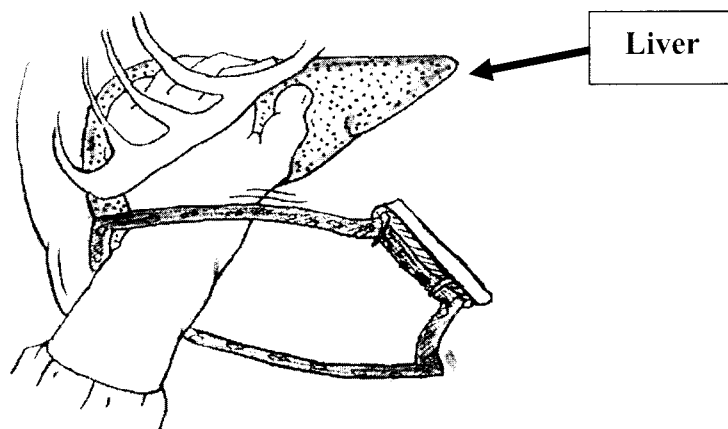
1. Kocher incision.
2. Rt upper paramedian (in Wilkie's, Saint's triad, in emergency or in narrow subcostal angle).

NB: Right paramedian incision: It's a muscle cutting incision & may injury 9th or 10th intercostal nerve.

3. Transverse incision: over the rectus sheath only

4- Procedure:

1. **1st of all:** full laparotomy to exclude associated Saint's triad or Wilkie's triad, this is done if the incision is midline or Rt. paramedian.
2. Introduce your hand between the liver & diaphragm to displace the liver slightly below the costal margin -by allowing air entry at this space- ; this brings the GB in the center of the field.

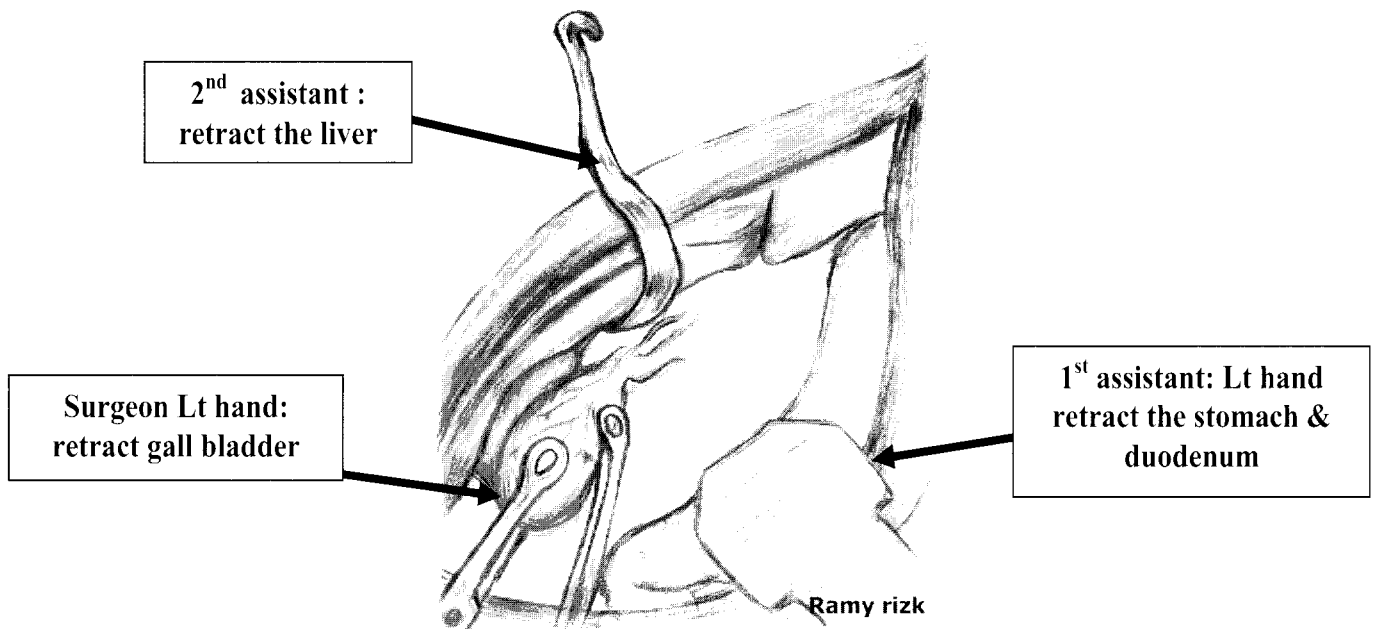


3. Widen the field by:

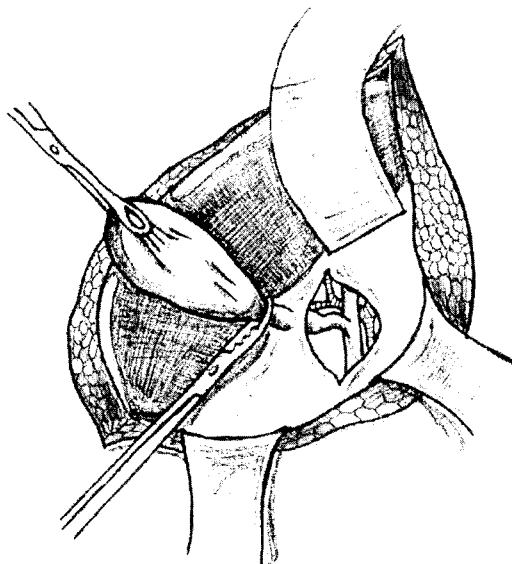
- a- **Assistant 1 (Lt. hand):** retract the stomach to the left & duodenum & transverse colon downwards.

b- Assistant 2: retract the lower border of the liver upwards by Diever retractor.

c- Surgeon (Lt. hand): retract the GB laterally by two GB clamps one for Hartman pouch & and the other for the fundus.



4. Incise the peritoneum at the neck of the GB to expose triangle of calot



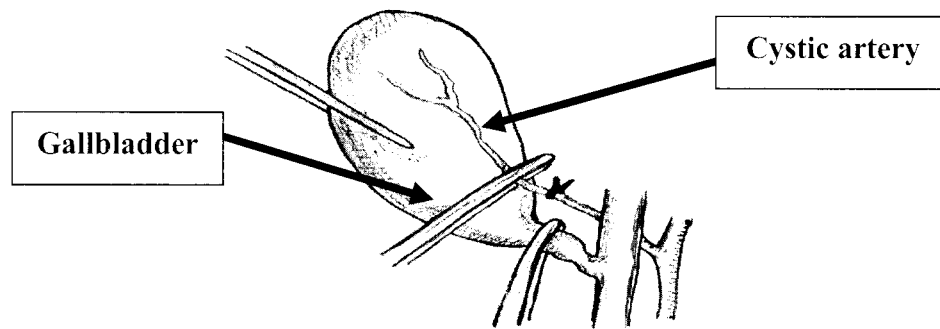
What are the boundaries??

5. Dissect the triangle of Calot to expose the cystic artery.

It is usually at a higher & more posterior plane than the cystic duct

6. Ligate & divide the cystic artery using right angle clamp because:

- It's fixing the duct.
- To avoid its injury during removal of G.B.
- To render the operation avascular.



NB: If you find *large cystic artery*, take care as it may be the Rt hepatic artery not the cystic artery (**Caterpillar anomaly**) so we may:

- Continue its dissection → to see it going to the liver but giving a smaller branch which is the cystic artery giving branches in the GB.
- Fundus 1st method (**retrograde method**) = search the cystic artery at the gall bladder surface.



N.B.

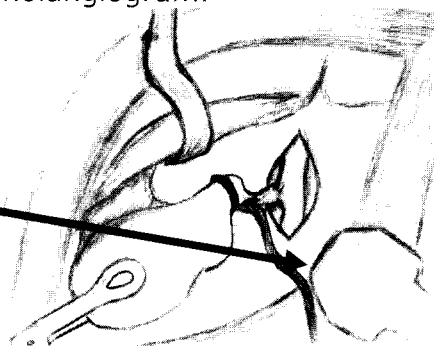
- *If Rt hepatic artery is ligated, give the pt post operative Ab to avoid septic infarction, but the infarction is rare as both liver lobes are communicating & taking blood also from the portal v.*

If the cystic artery is injured we may:

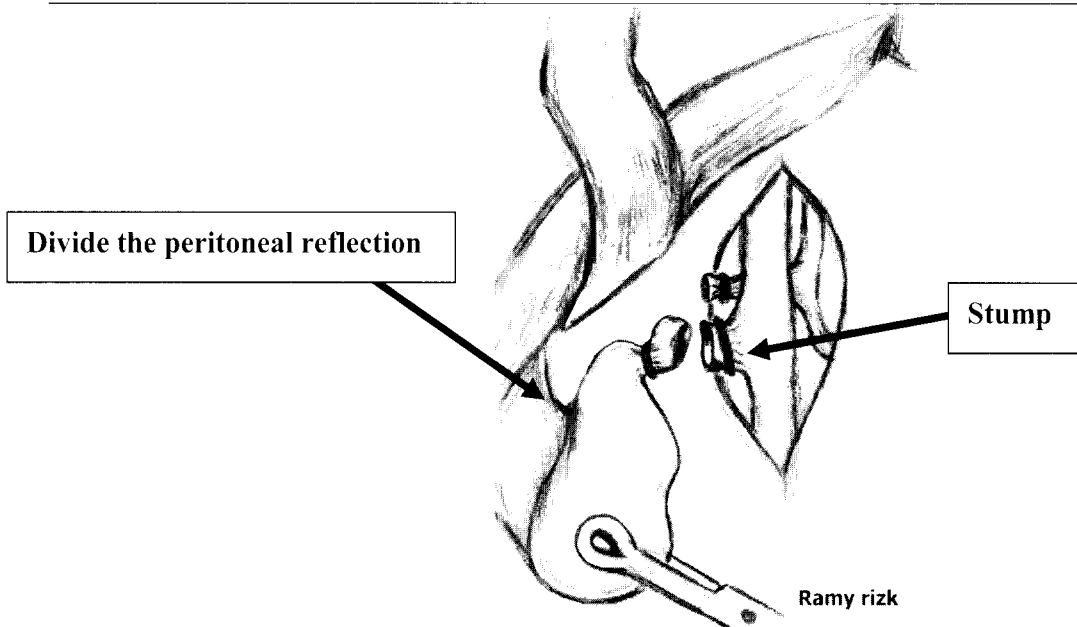
- *Compress it for few minutes then ligate it or.*
- *Pringle/s maneuver is done.*

7. Ligate the cystic duct using absorbable cat gut towards the G.B to avoid slipped stone → cannulate it → & perform intra operative Cholangiogram.

Cannulate the duct



8. Ligate the cystic duct with another ligature, towards C.B.D.
9. Divide the duct & leave a small stump.
(to avoid post cholecystectomy \$: old theory)



10. Divide the peritoneal reflection between the GB & the liver.
11. Dissect the GB out of its hepatic bed.
12. Send GB to histopathology.

5- Closure:

- 1- Absolute haemostasis = check the cystic artery & GB bed.
- 2- Place a drain into the GB bed. (Hepato-renal pouch)



N.B. *There may be cholecystohepatic ducts (= abnormal communication between liver & GB) that can leak bile (to avoid biliary peritonitis)*

3- Close in layers:

- Skin: using interrupted silk.
- Anterior rectus sheath + External oblique.
- Posterior rectus sheath + Transversus abdominis + Internal O.
- Peritoneum: using continuous cat gut.



N.B.

- ***We don't close rectus muscle because of its tendinous intersections & its segmental nerve supply.***
- ***If you found a mass & you weren't able to perform cholecystectomy:***
 1. Open the fundus.
 2. Remove the stone.
 3. Then insert Malecot or Folly tube + purse string sutures = (cholecystostomy)
 4. After 3 wks cholecystectomy is done.

V- Complications:**1- Primary hemorrhage: (due to injury of cystic artery):**

- Pringle's maneuver.
- Compression of hepatic artery at the free border of lesser omentum between left index (in foramen of Winslow) & left thumb (over the free border of lesser omentum).

2- Injury of important structures:

- a- CHD or CBD → stricture → obstructive jaundice.
- b- Accidental ligation of hepatic a.
- c- Injury of duodenum → repair in two layers + NG suction.

3- Postcholecystectomy jaundice:

- a- Missed stone in CBD.
- b- Stricture or ligation of CBD.
- c- Liver cell failure (due to ligation of hepatic a.).
- d- Incompatible blood transfusion
- e- Viral Hepatitis.
- f- Halothane toxicity.

4- Postcholecystectomy syndrome: Persistence of symptoms (pain or dyspepsia) post operatively. This is due to:

- a- Stricture of CBD.
- b- Missed stone in CBD.
- c- Long cystic duct stump (only if contains a stone)
- d- Biliary dyskinesia: Neuromuscular incoordination of the biliary apparatus that results in failure of relaxation of sphincter of Oddi.
- e- Wrong diagnosis: e.g. Duodenal ulcer.

5- Subphrenic collection. (Confirmed by U/S examination)

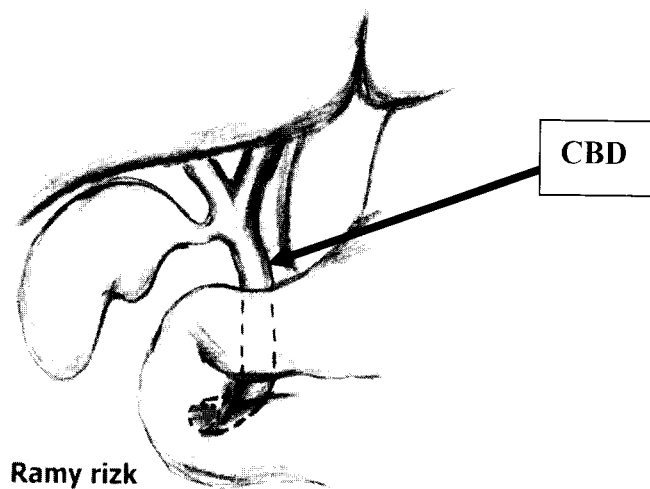
Choledocolithotomy & Exploration of CBD

I- Indications:

Preoperative:

1. History of jaundice.
2. Abnormal liver function ($\uparrow$ alkaline phosphatase).
3. Charcot's triad (pain, fever, jaundice).
4. Dilated CBD or CBD stones demonstrated by U/S, ERCP & PTC.

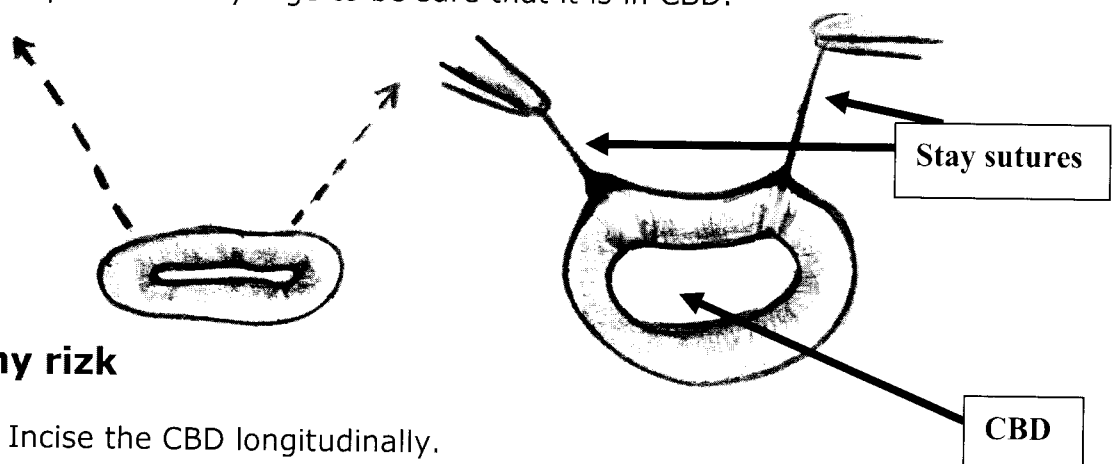
Intraoperative:



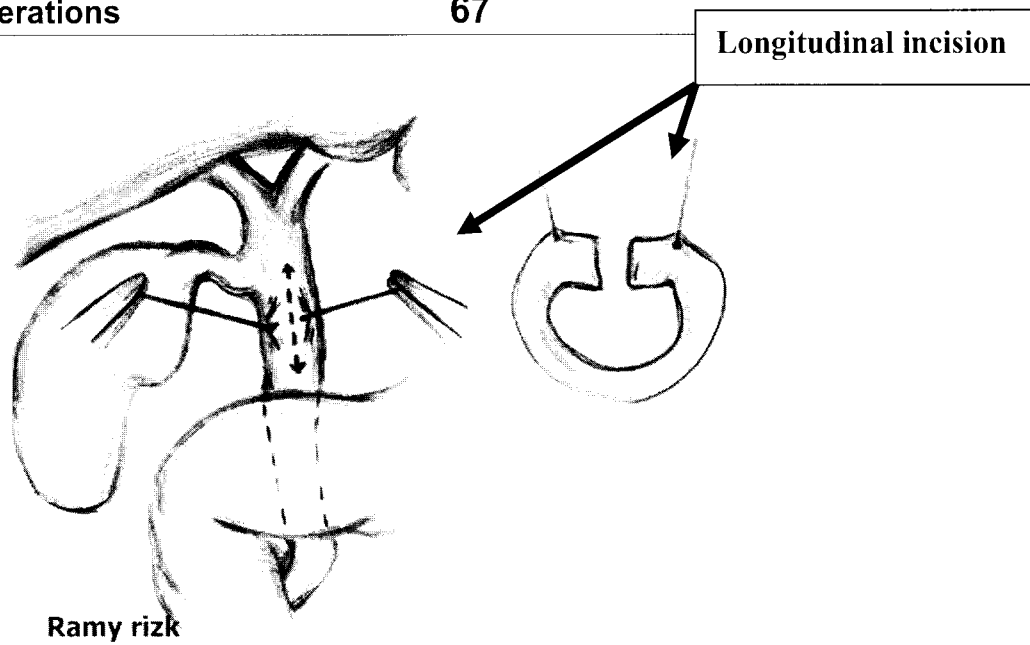
1. Dilated CBD > 12 mm.
2. Palpation of stone in CBD.
3. Single faceted stone.

II- Procedure:

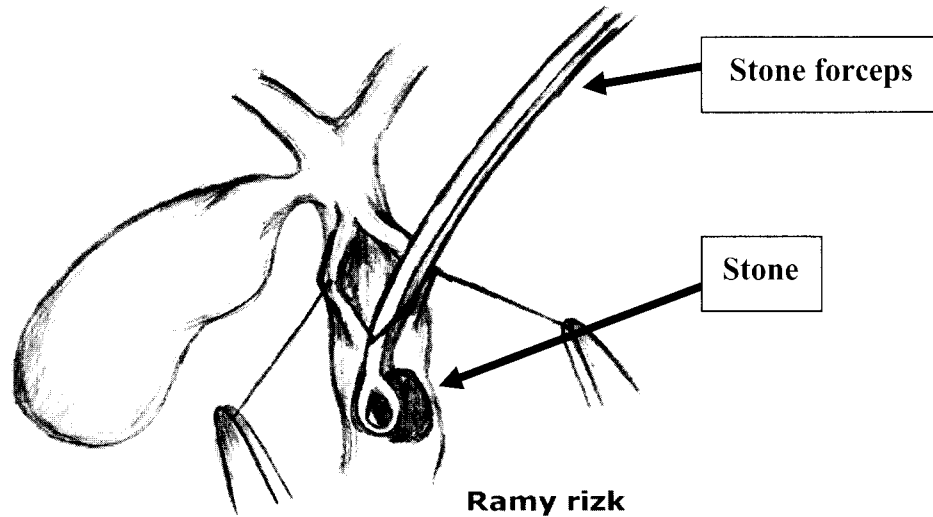
1. Place 2 stay sutures on either side of the supraduodenal CBD aspirate with syringe to be sure that it is in CBD.



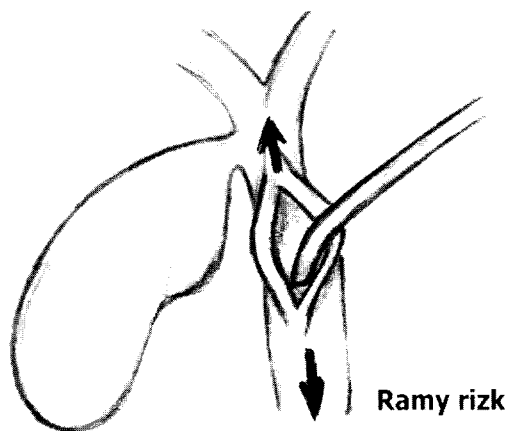
2. Incise the CBD longitudinally.



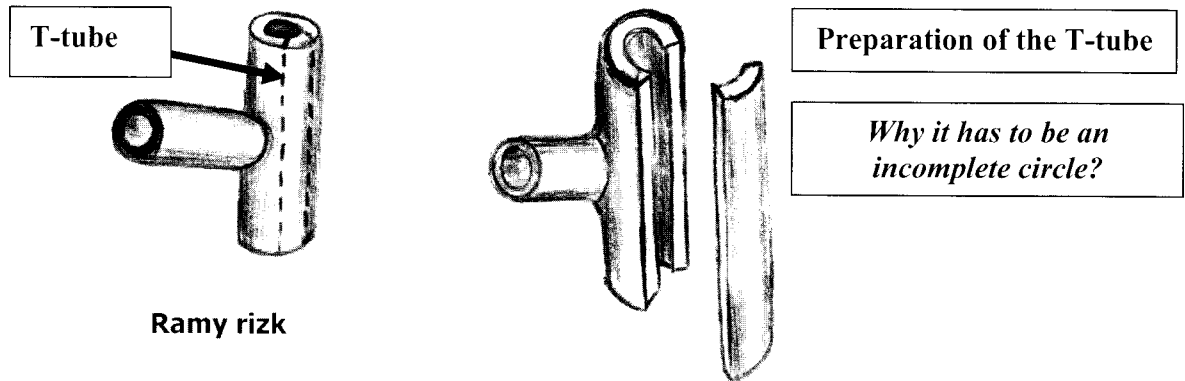
3. Remove the stones by stone forceps, or Fogarty's catheter.



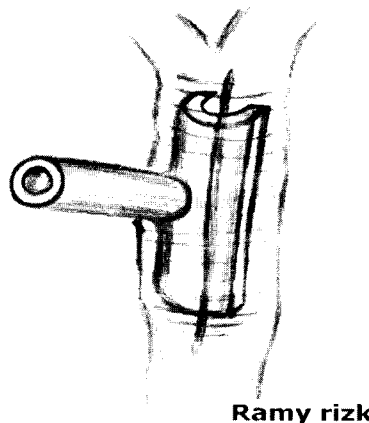
4. Inspect the CBD by choledocoscope.



5. Place a T-tube; inject dye (Intraoperative cholangiography if possible).



If intraoperative cholangiography is not possible →
6. Close the CBD over a T-tube.



7. Cholangiogram after 10 days is done.

III- Complications:

1- Intraoperative:

→ Accidental ligation of the CBD or hepatic artery.

2- Post-operative:

→ Early:

- Biliary leak.
- Wound infection, septicemia.
- Jaundice, retained stone.

→ Late: → Biliary stricture.

Possible oral questions

- 1- Anatomy of triangle of calot?
- 2- What is caterpillar anomaly?
- 3- What is saint & wilkie's triad?
- 4- Advantages of: early cholecystectomy ,conservative ttt?
- 5- Why acut appendicitis is treated by surgery while acute cholecystitis may be treated conservatively?
- 6- What do you know about fundus 1st cholecystectomy?
- 7- Indications of exploring common bile duct during cholecystectomy?
- 8- How do you manage hge from cystic artery or rt. Hepatic artery?
- 9- Causes of post-cholecystectomy syndrome?
- 10- Causes of post-cholecystectomy jaundice?

► References:

- B. & L. → 65 : 1113.
- Cavter, D.C, Russell (96) Chapman & Hall, London.
- Sherlock, S. and Dooley J. (eds) (2001), 11th edition, Oxford.
- Blumgavt, L.H. and Fong, Y. (eds) (2000), London.

Splenectomy

I- Indications:

A- Absolute:

1- Trauma:

- If splenic preservation of no value.
- Search for an associated Lt renal injury.
- In children if severe trauma with huge spleen → splenectomy & re-implantation of a part of the spleen.

2- Blood diseases:

- i. Thalassemia
- ii. Hereditary spherocytosis.
- iii. ITP.
- iv. Sickle cell anemia
- v. Some patients with acquired hemolytic anemia

3- Wandering symptomatic spleen.

4- Aneurysm of splenic artery –If ligation will cut splenic blood flow.

5- Cysts, abscess & tumors of spleen.

B- Relative:

1. Bilharzial splenomegaly (alone or with Hassab's operation) IF:

- Manifested hypersplenism.
- Splenic vein thrombosis.
- Huge spleen –Mechanical disability.

2. Acquired hemolytic anemia.

3. Left sectorial portal hypertension.

4. Gaucher's disease.

5. Staging laparotomy: → Hodgkin's lymphoma to avoid

- Hypersplenism.
- Radiation induced nephritis of left kidney.

6. Part of an other operation:

- portal hypertension.
- Cancer of the stomach & pancreas.

II- Preoperative preparation: according to indication:

- Trauma → Resuscitate (antishock measures, Ryle's tube) & Monitor.
- Blood diseases → check Hb, WBCs, platelets.
- Platelet concentrate in ITP (Preoperative & after ligation of splenic artery)
- Portal hypertension → check PT, serum protein, other liver functions (Child's classification).
- **Elective splenectomy** → Correct anaemia, hyporalbuminaemia... etc., Treat chest infections –as It's an upper abdominal operation, Ryle's tube (Pre-, Intra- & Postoperatively).
- Long acting penicillin & pneumo vaccine immunization

III- Anesthesia:

→ General anesthesia

IV- Steps:

1. Position: → Supine.

2. Skin preparation:

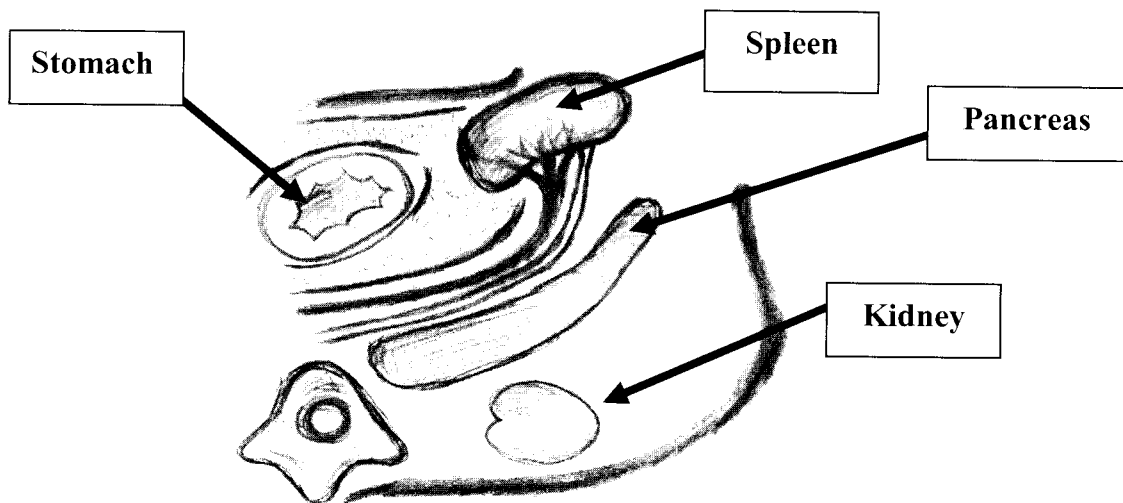
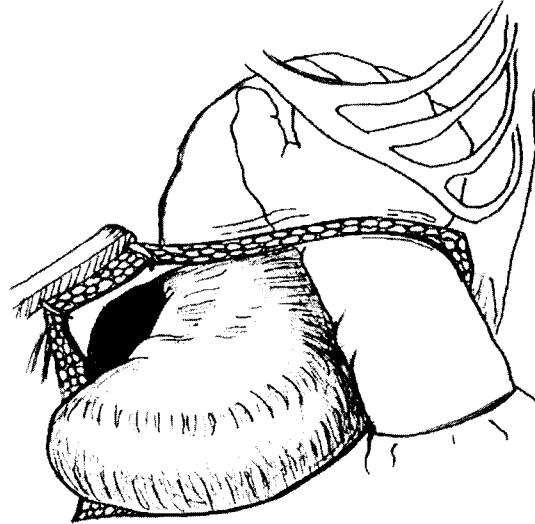
3. Incision:

- 1) Upper abdominal midline incision (in Trauma).
- 2) Upper abdominal Left paramedian incision. (Classic one)
- 3) Lt subcostal incision. (Especially for Bilharzial spleen -adhesions)

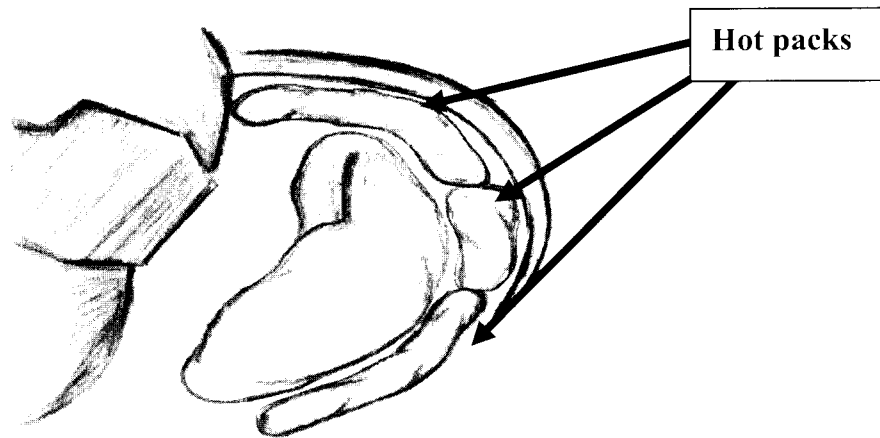
- 4) Thoraco-abdominal incision (in case of perisplenitis: due to presence of portosystemic anastomosis, where blunt spleen dissection carries the risk of intraperitoneal hge)

4. Procedure:

- 1) Place the **Right** hand on the lateral surface of spleen & pull it medially



- 2) Deliver the spleen into the wound by placing hot packs between the spleen & the diaphragm.



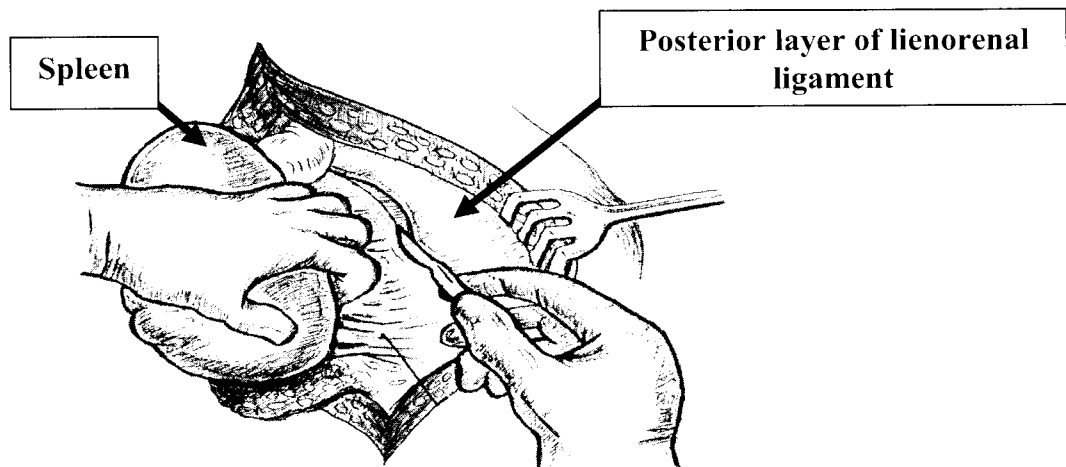
Ramy rizk



N.B. Importance of hot packs:

- 1- Support of diaphragm
- 2- Control minor bleeding from splenic bed
- 3- Keep spleen in wound (preventing its fall in abdomen)

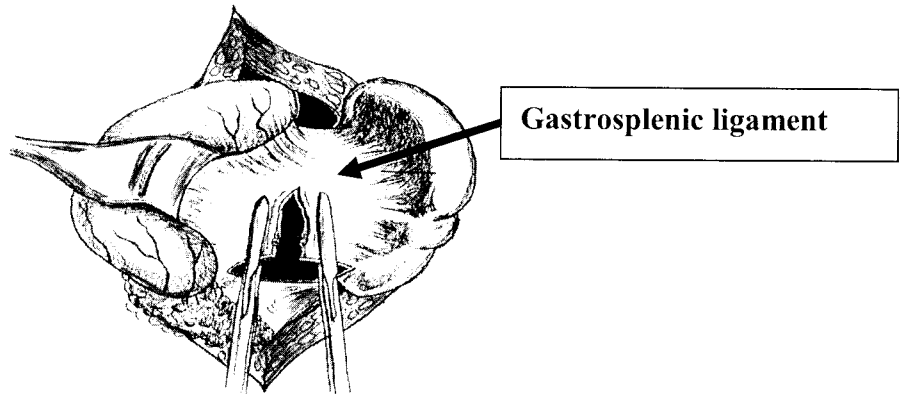
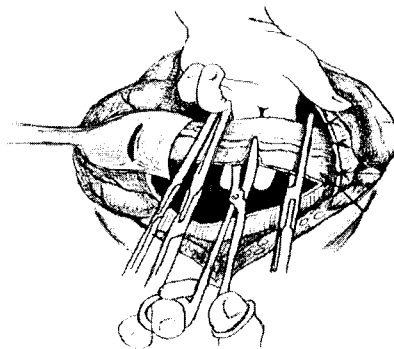
- 3) After the spleen is drawn medially, divide the posterior layer of the lienorenal ligament.

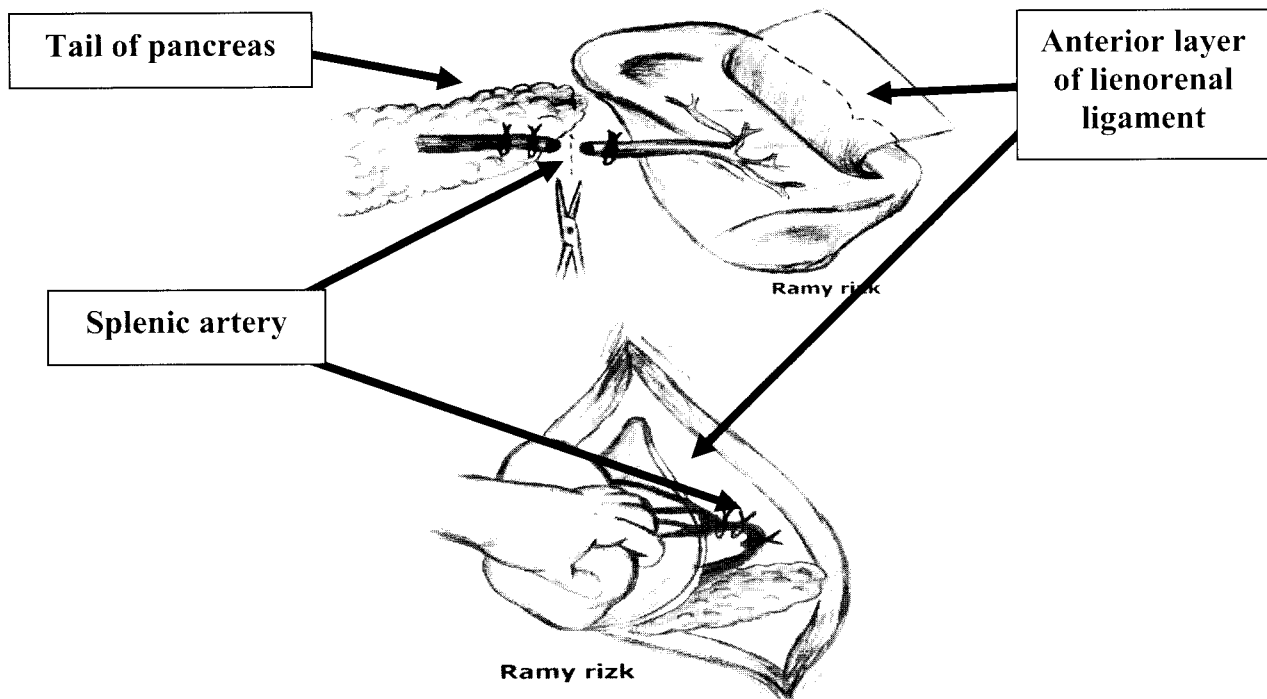


4) Ligate & divide the gastrosplenic ligament.

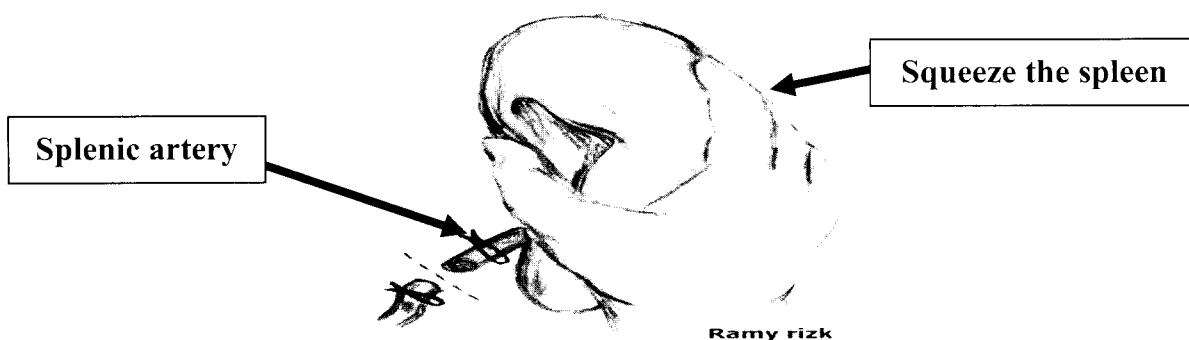
(Containing short gastric & left gastroepiploic vessels) why?

- To fully deliver the posterior pole of spleen.
- Open lesser sac to expose the anterior layer of lienorenal ligament containing splenic vessels & pancreatic tail.
- If bleeding occurred (common), Ligation of short gastric vessels in hurry may injure the stomach.

5) Divide the anterior layer of the lienorenal ligament.
(to expose splenic vessels & tail of pancreas)6) Separate the tail of pancreas from the vessels (gently) then
ligate & divide the splenic arter



- 7) Devascularization: But you should first test the tensile power of the thread.
- **Mass ligation:** i.e. ligation of the artery & vein together.
 - * Disadvantages: → A.V. fistula.
 - Slipped ligature.
 - **Individual ligation:** i.e. ligation of the artery & the vein separately.
 - Use silk or better Vicryl.
 - Use 3 ligatures.
 - Divide between the distal 2 ligatures.
 - We can use 3 splenic pedicle clamps & divide between distal 2 & replace the proximal 2 clamps by ligatures.
 - After ligation of the artery, squeeze the spleen (autotransfusion) & infuse platelets in I.T.P.
 - **Selective ligation:**
 - Splenic vessels' branches are cut between artery forceps & then ligated.



- 8) Complete splenectomy by dividing the residual peritoneal attachment to colon & stomach

- To exclude other injuries (**in trauma**).

5. Closure:

- #### **IV- Post operative treatment:**

→Antibiotics.

→ Remove drain after 2-3 days & stitches after 10 days.

N.B.

- If there are 2 or 3 adhesions, ligate and divide them.

- In trauma:*** suck out all free blood clots.



A- Operative:

- 1- 1ry hemorrhage**

- 2- Injury of** → stomach, tail of pancreas & diaphragm

B- Postoperative:

Early

- 1. Reactionary hemorrhage** due to slipped sutures or hypertension.

- ## 2. Hematemesis.

(Ligation of short gastric a. → congestion of submucosal fundic varices)

- 3. Burst abdomen** (5-7th day) due to:

- Injury of the tail of pancreas.
- Hypoproteinemia.
- Abdominal distension.

- 4. Gastric fistula:** Due to injury of the wall of the stomach during ligation of short gastric vessels

5. **Pancreatic fistula:** May follow damage to tail of pancreas during mobilization of splenic pedicle. (May be accomplished by left pleural effusion, peritoneal effusion or abdominal wound dehiscence)
6. **Subphrenic collection.**(hematoma or abscess)
7. **Acute gastric dilatation:** Following mobilization of stomach to ligate short gastric vessels
8. **Chest infection.**

Late

- 1) **Postsplenectomy bacterial infections:**
 - Spleen phagocytoses bacteria specially encapsulated type.
 - Patients with splenectomy are susceptible to infections produced by streptococcus pneumonia, Neisseria meningitides & Hemophilus influenza
 - Risk is higher if splenectomy is done in childhood.
 - A serious form is overwhelming post-splenectomy sepsis (OPSI) which is fatal.
 - Splenectomized children should receive anti-pneumococcal vaccine (pneumovax) meningococcal vaccine & anti-haemophilus influenza vaccine until the age of 18 years.
 - Patients should take Amoxil at first sign of febrile illness
- 2) **Thrombocytosis (& Portal vein thrombosis):**

Splenectomy is followed by rise in white blood cells & platelets (→ Give baby aspirin).
- 3) **Splenosis** (implantation of scattered splenic tissue).

Possible oral questions

- 1- Anatomy of the spleen?
- 2- Peritoneal attachment of the spleen?
- 3- Indications of splenectomy?
- 4- Preoperative preparations of splenectomy?
- 5- How do you manage stap in left hypochondrium?
- 6- Mention techniques for splenic preservation?
- 7- Complications of splenectomy?
- 8- Causes of splenomegaly, huge spleen?

► References:

- B. & L. → 64 : 11034-93.
- Glasgow, R.E. and Mulvihill (99), World Journal of Surgery 23 (23:384-8).
- Weatherall, D.J (97). British Medical Journal 341:492-496.
- British Medical Journal 312:430-4.
- <http://www.ssat.com/guidelines/spleen7.htm>.
- <http://www.scotland.gov.uk/health/cmobulletetin/hb591.09.asp>

Anal Operations: Lay Open Track for Anal Fistula

I- Indication: → Low fistula.

II- Preoperative preparation:

- **2 enemas:**

- One in the day before the surgery.
- One in the day of the surgery.

- **3 distances:**

- PR.
- Proctoscope.
- Sigmoidoscope.

- **4 fingers:**

- Dilate the anus by 1 finger on each side then 2, 3, 4, till the resistance gives away.

III- Anesthesia: → General or spinal anesthesia.

IV- Steps:

1- Position: → Lithotomy position.

2- Skin preparation.

3- Procedure:

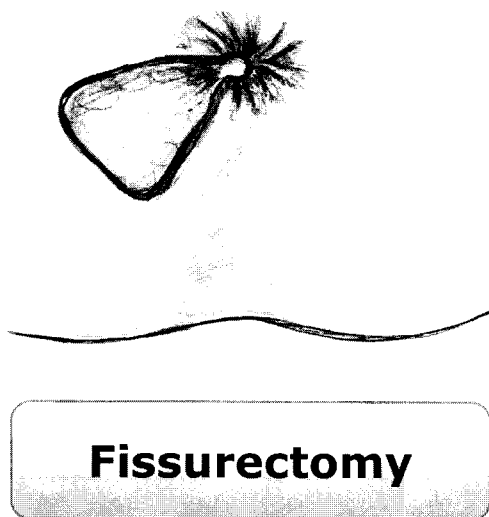
- a- Pass a probe from the fistula opening of the fistula towards the anal canal.



- b- The track is slit-opened along its length.



- c- A triangular area of perineal skin & adjacent mucosa is removed leaving a raw area to heal by granulation.

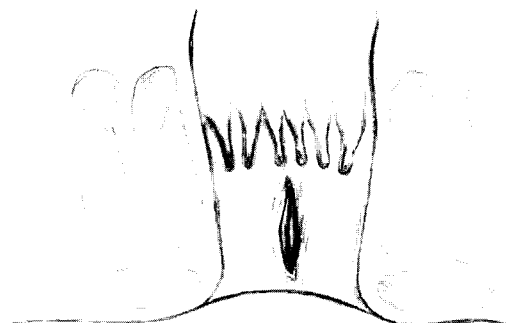


I- Indication: → Chronic anal fissure

II, III, IV: → 1, 2: → As lay open.

3- Procedure:

- a- If the anal sphincter is still narrow perform sphincterectomy by incising the internal sphincter

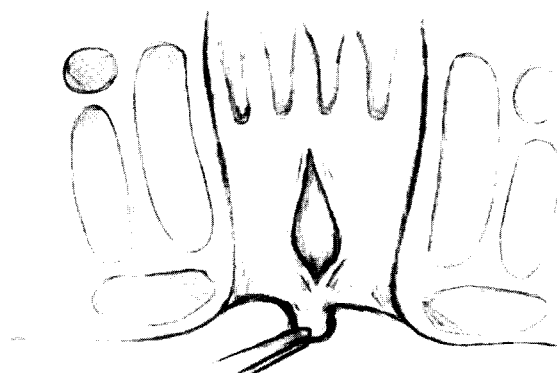


N.B.

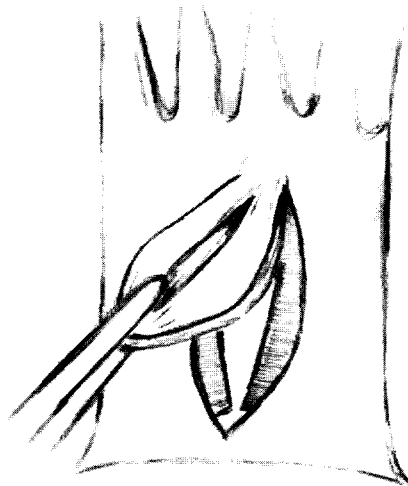
- Incise only 2 cm of the sphincter which is 4 cm.
- Incise the sphincter at the lateral or the post side but lat. is better
- Why lateral is better??
- How to differentiate the internal sphincter from the two of external sphincters??

b- Two light tissue forceps are placed on the mucocutaneous junction to each side of the fissure.

c- They are drawn downwards until the fissure comes into view.



d- With the knife, the fissure & its fibrous tissue are excised by elliptical incision.



e- Give analgesics, laxatives post operatively till healing.

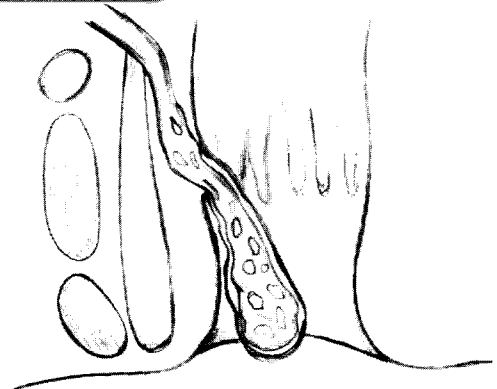
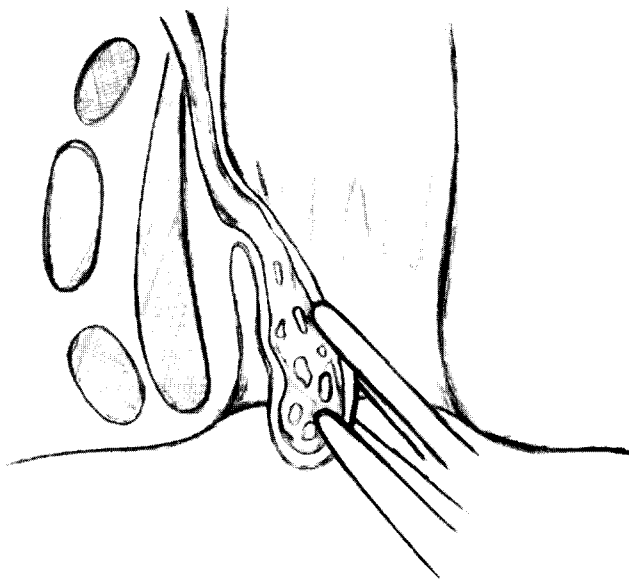
Haemorrhoidectomy

I- Indication: → 4th degree piles.

II, III, IV → 1, 2: → As lay open.

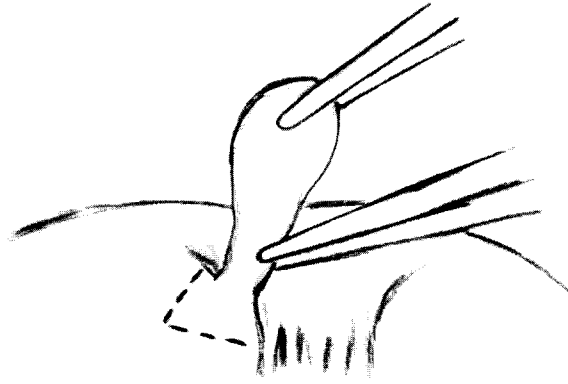
3- Procedure:

1) The haemorrhoid is fixed by Allis, artery forceps.



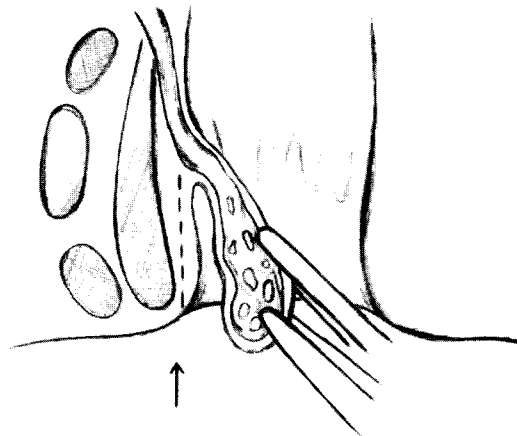
2) V-shaped incision is done in the:

- Skin.
- Corrugator cutis ani muscle.
- Mucous membrane.

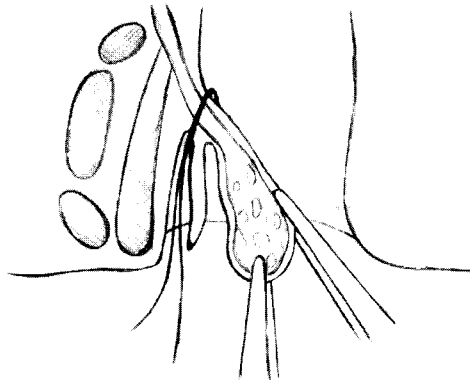


N.B. Cut the skin less than the m.m. as rate of growth of skin is less than that of the mucous membrane so that the skin into mucous membrane.

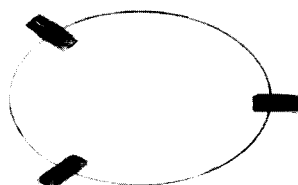
- 3) Push the internal sphincter lateral till the pedicle.



- 4) Transfix & ligate the pedicle of the haemorrhoid with a silk suture leaving a long length of the suture material attached.



- 5) Excise the haemorrhoid 0.5 cm distal to the ligature.
6) Repeat the procedure for the haemorrhoids at 7 O'clock then 3 then 11 (to keep the field as clear from blood as possible).





N.B. Leave a mucocutaneous bridge between each haemorrhoid to prevent any subsequent stricture.



- 7) Place a small paraffin soaked pack (to ↓ bleeding in the canal).
- 8) Encourage bowel action with adequate analgesia & laxative.
- 9) At the 5th post-operative day, do digital rectal examination to exclude anal stenosis.

V- Complications:

Early:

- Hge:
 - Reactionary.
 - Secondary (treated by packing).
- Acute urinary retention (due to reflex spasm of external urethral sphincter, don't rush for catheter).
- Constipation (due to pain during defecation).

Late:

- Anal stenosis.
- Recurrence.
- Incontinence with sphincter damage.

VI- Contraindications:

- i. 1st & 2nd degree piles. (Treatment is conservative).
- ii. Open pulmonary T.B. sinus.
- iii. 2ry piles.

Possible oral questions

- 1- Anatomy of the anal canal?
- 2- D.D of painful anal conditions?
- 3- Conservative ttt of acute fissure?
- 4- Importance of PR examination in piles?
- 5- Complications of internal piles?
- 6- Treatment options of internal piles?
- 7- Classification of :
 - Anorectal abcess
 - Anal fistula
- 8- Why lateral sphenterectomy is better than the posterior one?
- 9- Importance of mucocutaneous bridge between each haemorrhoids

► Refrences:

- B. & L. → 72 : 1242/1241.
- Fielding, L.P and Goldberg, S. (eds) (99) 2nd edition, London

Kidney Operations

Exposure of the kidney:-

- 1- Lumbar approach.
- 2- Transabdominal (anterior) approach.
- 3- Vertical laparotomy.

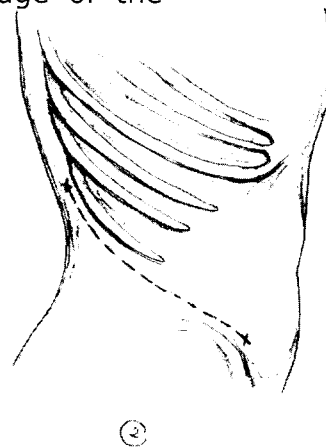
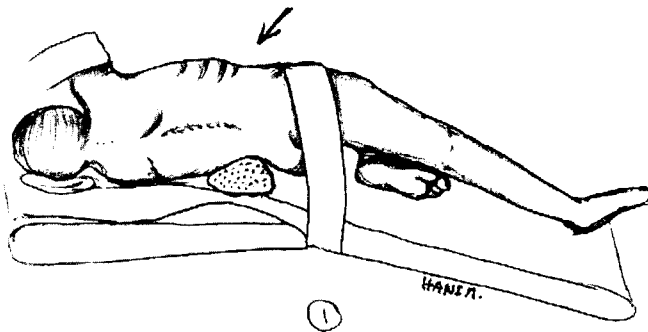
1. Lumbar approach:

1- Anesthesia: → General or high spinal.

2- Steps:

1- Position:

- **The patient:** lies on the **healthy side** with:
 1. Flexing leg of the healthy side (to Prevent rolling of the patient)
 2. Extending the leg of the diseased side **(1)**
 3. With the back close top the edge of the table



N.B.



- Position is maintained by sand bag in front of the patient or special binder over the buttocks.
- For good exposure we extend the leg of the same side.
- The table: the middle of the table is raised up to open the space between the ribs & the iliac crest (loin).
- The arm on the diseased side is supported on a lever (open the loin for incision - prevent rotation – decrease pressure on the chest).

- **The Surgeon:** stands facing the patient back.

2- Sterilization & toweling.

3- Incision:

→ **Morris (lumbar) incision:**

N.B. Immediately before incision look at patient X-ray to make sure of the site and position of stone and any abnormality of the last rib.

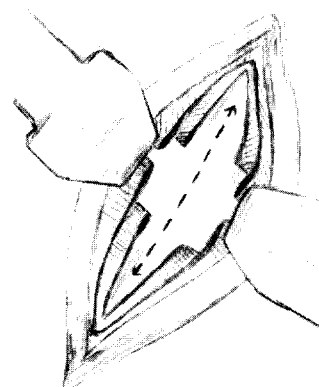
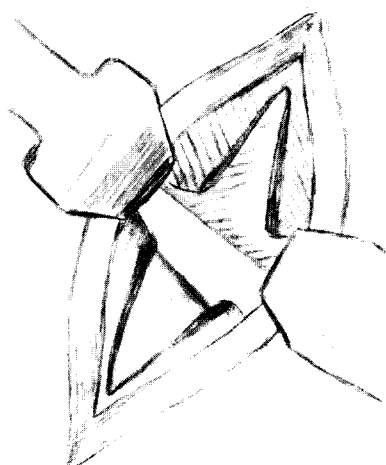
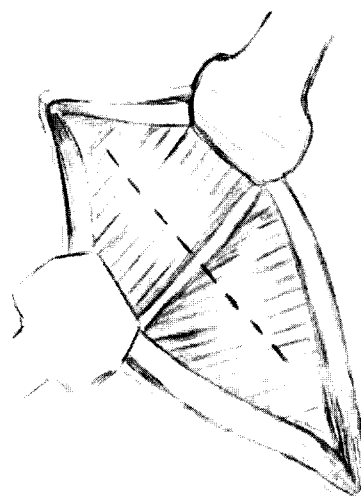
- a. Starts just below the renal angle (= junction of the last rib with lat border of sacro-spinalis ms) → to avoid injury of pleural recess (2)
- b. & passes downwards & forwards to about 1" above the ASIS.

N.B. The 12th rib may be resected through the incision to give good exposure especially if the kidney is large & the loin is narrow

c. The incision cuts:



- Skin, superf. fascia, deep fascia.
- + in the post. 1/2: (3 muscles).
 - Latissimus dorsi muscle.
 - Serratus post inferior muscle.
 - Quadratus lumborum muscle.
- + in the ant 1/2: (3 muscles.)
 - External oblique muscle.
 - Internal oblique muscle.
 - Transversus abdominus muscle.



- d.** The last rib can be removed (subperiosteal) if the kidney is big.
- e.** Peritoneum is peeled anteriorly (gauze) from the kidney to expose para-renal fat.
- f.** The ZuckerKerkandl fascia is incised between 2 artery forceps & the kidney is exposed by blunt (finger) dissection from the surrounding perinephric fat.

4- Closure:

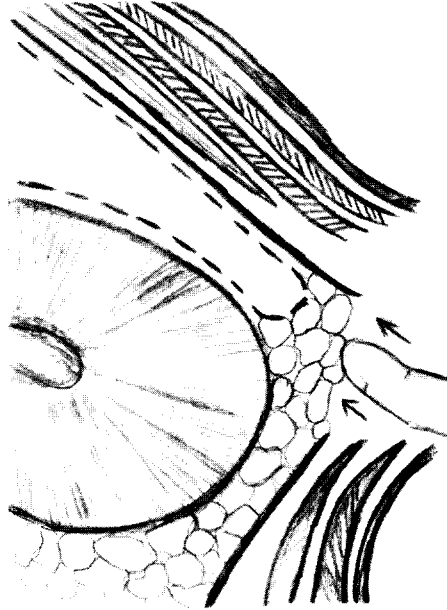
- 1- Lower the bridge of the tables.
- 2- Close in layers with chromic cat gut or better prolene.

5- Advantages:

- 1- Direct exposure.
- 2- It is extra-peritoneal approach (no paralytic ileus).

6- Disadvantages:

- 1- Limited exposure.
- 2- Not suitable for large renal masses.

**2. Transabdominal (anterior) approach:****Indications: (4T)**

- 1- Renal **T**umors (In hypernephroma → as we ligate renal vessels 1st).
- 2- **T**oo large kidney.
- 3- Renal **T**rauma (for associated injuries – as spleen - & intraperitoneal rupture kidney).
- 4- Renal **T.B.** (→ Nephroureterectomy).

3. Vertical lumpectomy: (Very recent)

- In thin patient.
- Experienced surgeon.

Nephrectomy

Indications: (only if the other kidney is healthy)

- Advanced hydronephrosis (to prevent hypertension).
- Advanced pyonephrosis.
- Renal tumors.
- Renal TB.
- Renal stones (complicated with):
 - o Hydronephrosis.
 - o Pyonephrosis.
 - o Squamous cell carcinoma.
- Rupture kidney.
- Large bipolar renal cysts.

Contraindications:

- Bad general condition.
- When the other kidney is absent or with poor function.

1- Anesthesia: → general or high spinal.

2- Incision: → **Morris (lumbar) incision:**

3- Procedure:

1- Devascularization:

- By gentle gauze stripping expose renal pedicle anterior & posterior (ant...vein → artery → pelvis (post.) V.A.P).

Ligation is done as follows:

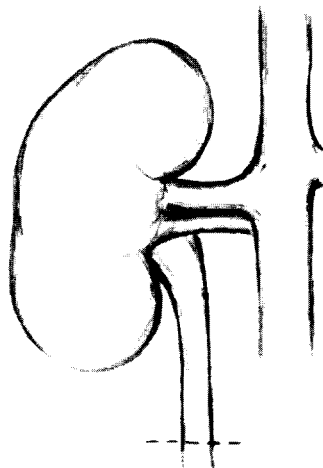
A- Mass ligation: done if the pedicle is short or obscured (adhesions).

B- Individual ligation:

- Artery then the vein are ligated separately.
- Artery 1st to decrease congestion.
- Advantages:
 - ↓ Incidence of slipped ligature whether 1 or 2 of renal vessels are cut between 2 renal pedicle clamps or 2 ligature proximally and 1 distally and replaced by ligature

we can use:

- Strong cat gut (3).
- Strong vicryl (best).
- Silk not in T.B or pyonephrosis → sinus.



- Ligation of the ureter.
- Dissect the ureter and ligate it 2 ligatures as low as possible and paint the stump with alcohol.

4- Closure:

- o In layers with drain in the retro-peritoneal.

Complications:**1- 1ry hemorrhage (Slipped ligature):**

- From renal vessels (esp. with mass ligation).
- (TTT → packing 5 - 10 minutes then control the bleeder a.).

2- Injury of:

- a- Peritoneum.

(TTT → close it surgically).

- b- Pleura.:

(TTT → suture around tube with under water seal).

- c- Duodenum (Rt. nephrectomy) → bile in the wound.

(TTT → closure in 2 layers + drain).

- d- IVC (Rt. nephrectomy).

(TTT → packing 10 minutes → catch the tear using Satinsky (IVC) clamp) → vascular suture 5/0

Special problems:**1- Subcapsular nephrectomy:**

- Done in pyonephrosis (adhesions).
- Incise capsule on convex border → dissect the kidney → medial incision (Devascularization).

2- Large hydronephrosis:

- Do purse- string → introduce trocar & cannula → aspiration → ↓ size → with draw the cannula & ligate the purse-string.

3- Radical nephrectomy:

- Done in case of malignancy, we remove the kidney (+) perinephric fat + enlarged L.Ns.

Operations for Urinary Stones

1- Nephrolithotomy

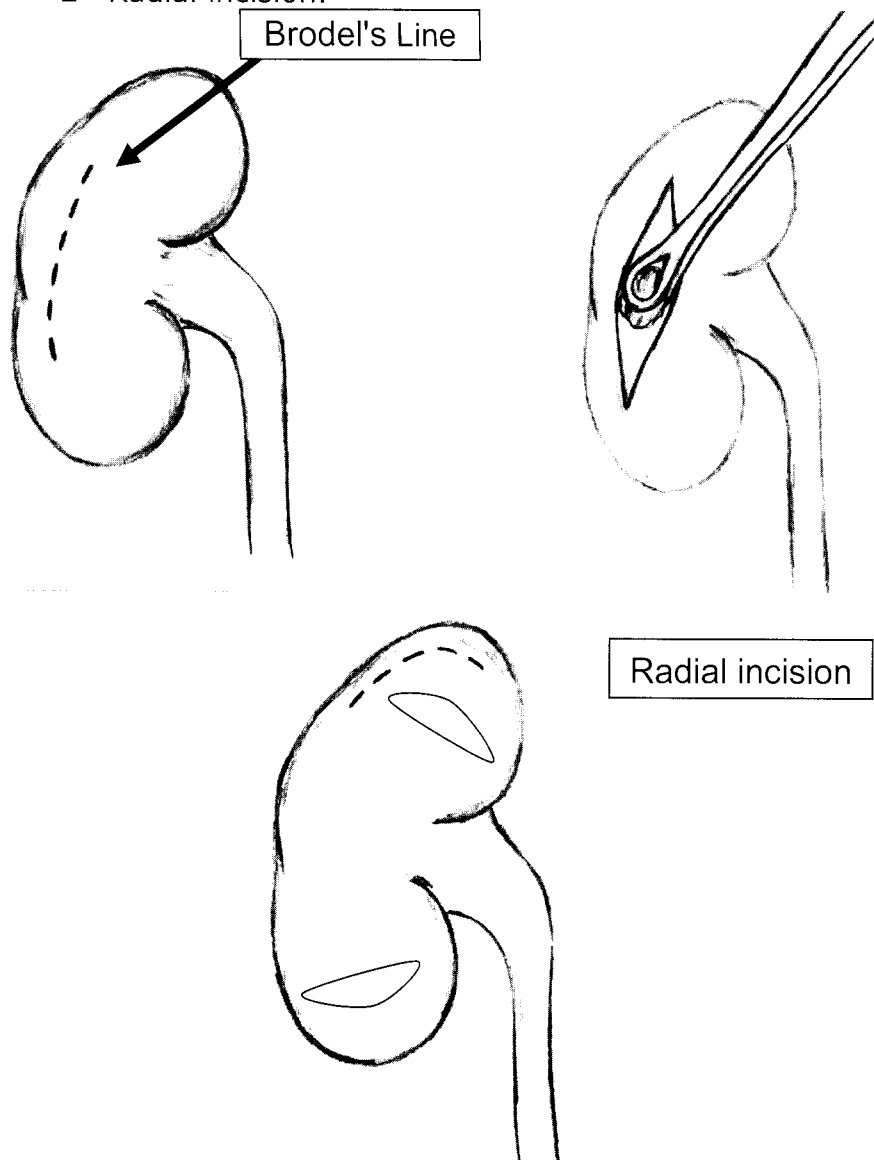
(Stone removal via incision in renal parenchyma)

I- Indications: → A stone impacted in a calyx with wide neck (forcible removal leads to severe bleeding).

II, III 1, 2 → As nephrectomy.

3- Procedure:

- a- The site of the stone is identified by X-ray or palpation of the stone through the kidney substances.
- b- Incision of the kidney to extract the stone by one of the two methods:
 - 1- Longitudinal incision through Brodel's bloodless line.
 - 2- Radial incision.



- c- The stone is removed by nephrolithotomy forceps.

4- Closure:

- As nephrectomy.
- The incision of the kidney is closed by chromic cat gut, U-shaped mattress sutures.

2- Pyelolithotomy

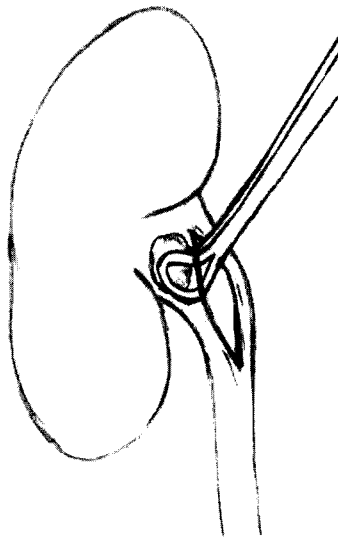
(Removal of a stone via incision in the pelvis)

I- Indications: → For a stone in the pelvis of the kidney.

II,III: → 1, 2 → as nephrectomy.

3- Procedure:

- a- Expose the kidney → reflected medially (to expose the pelvis) → carefully dissected.
- b- Catch the kidney by left hand (thumb post. & other fingers ant.) to fix the stone in pelvis.
- c- Open the renal pelvis (radial incision not crossing P.U.J to avoid strictures & injury of post. descending branch of renal artery) & remove the stone by pyelolithotomy forceps & compare it with the X-ray (don't catch soft tissue).



N.B. It is better to avoid incising the pelvis along its direction with the ureter to prevent extension of the incision to the ureter, so transverse incision may be done.

4- Closure: as nephrectomy (**close with retro-peritoneal drain**)

- If urine is clear:

→ Close the wound in renal pelvis by plain cat gut absorbed after one week.

- If urine is infected:

→ Put a drain beside the pelvis & remove after 4 days.

Advantages (over nephrolithotomy):

- 1- No destruction of renal tissues.
- 2- Less bleeding & rapid healing.

3- Ureterolithotomy

I- Indication: → A stone in the ureter.

II- Anesthesia: → General or high spinal.

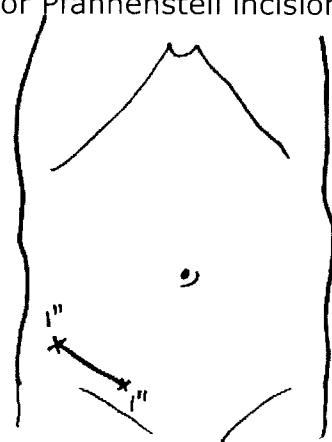
III- Steps:

1- Position:

- As nephrectomy → if the stone is in upper 1/3.
- Supine → if the stone is in the lower 2/3.

2- Incision:

- Upper 1/3: Morris incision.
- Middle 1/3: Abernethy incision (ms cutting by oblique incision) it starts 1 " above & medial to A.S.I.S. & extends downwards to 1" above the mid inguinal point (11).
- Lower 1/3: Midline suprapubic incision or Pfannensteil incision.



3- Procedure:

- Cut all layers:
 - Skin, subcutaneous tissue.
 - Ext oblique, int. oblique, transversus abdominus muscles.
- Push the peritoneum medially → the ureter is seen crossing the bifurcation of the common iliac vessels.
- Suspend the ureter by ring or lanz forceps (to prevent downward slipping of the stone).
- Open the ureter above the site of the stone because:
 - At site of stone there is stricture & inflammation.
 - Above the level there is dilatation & the stricture below prevents its escape.
- Remove the stone by ureterolithotomy forceps.

4- Closure: → as pyelolithotomy.

4- Suprapubic Cystolithotomy

Indication: → Large stone in the bladder.

Anesthesia: → General or spinal.

Steps:

1- **Position:** → supine.

2- **Incision:**

a- Fill the urinary bladder with saline & apply a clamp to the catheter (not routine).

b- Midline suprapubic incision (bad cosmesis & causes hernia) or transverse incision (Pfannenstiel).

3- **Procedure:**

a- Push the peritoneum upwards.

b- If saline was injected, empty the bladder.

c- Apply 2 bladder forceps on the bladder.

d- Open the bladder at its center.

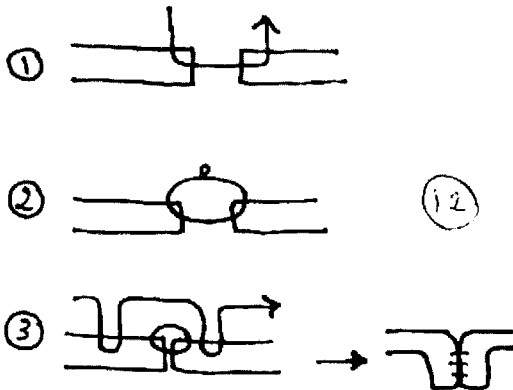
e- Remove the stone by cystolithotomy forceps.



N.B. Take a look on the inner wall of the bladder, as the stone is precancerous → so if a lesion is found → biopsy.

4- **Closure:**

- Close the bladder without mucosa in 2 layers (all through then inverted lembert) with chromic cat gut. **(12)**
- Put a drain in the retropubic space.
- Put a catheter to avoid extensive pressure.
- Close the wound.



How to identify the ureter?

- Not pulsating.
- But there is peristalsis.
- Not the psoas minor (as it has no lumen but is a flat tendon).
- Not the colon (as the blood supply of the colon is circumferential but of the ureter is longitudinal).
- The ureter passes on the bifurcation of the common iliac artery.
- The stone can be palpated along the ureter's course

How to recognize the bladder?

- Fasciculated appearance.
- Perivesical fat.
- Perivesical venous plexus (large thin veins).
- Inject saline via Foley's catheter → bladder will be distended.
- The stone can be palpated within the bladder.

Complications of kidney operations**A- Operative:**

- 1- **Haemorrhage:** 1ry.
- 2- **Injury :** e.g
 - a- Subcostal nerve & vessels.
 - b- Pleura & peritoneum.
 - c- I.V.C & duodenum.

B- Post-operative:

- 1- **Reactionary Hemorrhage:**
 - Slipped ligature either drain Hge. or haematuria (**TTT is exploration & securing**)
- 2- **Sinus formation: dt.**
 - a- F.B. e.g. silk
 - b- Osteomyelitis of the last rib.
- 3- **Urinary fistula:** (Usually due to distal obstruction)
 - a- Stricture.
 - b- Missed stone.
 - c- Bladder neck obstruction.

Possible oral questions

- 1- Sites of ureteric strictures "sites of stone impaction" ?
- 2- Indications of surgical ttt in renal injuries?
- 3- Types and complicationst of renal stones?
- 4- Treatmant options of:
 - Renal stones
 - Ureteric stones
 - Vesical stones
 - Urethral stones
- 5- How can you identify the ureter, bladder intraoperatively?
- 6- Complications of kidney operations?

► Refrences:

- B. & L. → 75:1305/1333.
- Campbell, M.E, Walsh, P.C, (eds) (2002), Philadelphia.
- Tanagho, E.A and McAn.Ch, T.W. (eds) (2000) 15th edition, Newyork

Circumcision

Indications:

A- In infants:

- 1- **R**eligious (commonest).
- 2- **P**himosi*s*.
- 3- **R**ecurrent balanitis.
- 4- Long **p**repuc*e*.

B- In adults:

- 1- Para-phimosi*s* (emergency).
- 2- Balanitis.
- 3- Before radiotherapy (cancer).
- 4- Inability to retract in intercourse.

Contraindications:

- Hypospadi*s*.
- Hemophilia.
- Having bad general condition.

Timing:

- 1st 6 hours after labour (there is excessive maternal clotting factors).
- After 15 days (synthesis of own clotting factors).
- Generally: it is done in the 1st 3 months as the pain perception is not

fully developed (low vagal tone)

Advantage:

No smegma (irritant) → ↓ cancer penis & cancer cervix.

Disadvantage:

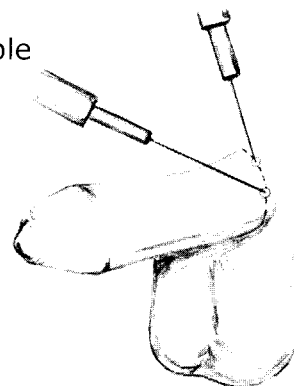
Fastens the ejaculation → (premature ejaculation).

Preoperative preparation:

- If prothrombin time is low → vit. K every 12 hours IM
- Prevent erection in adults by sedatives.
- Sufficient skin over the penile shaft must be retained to allow an erection without skin tension

Anesthesia:

- Many practitioners now use one of the three available local anesthetic techniques:
 - Topical anesthetic (EMLA) cream.
 - Ring block (local anesthesia) is done by injecting local anesthetic around the bottom of the foreskin near where the incision will be made.
 - Penile block (nerve block) is done by injecting local anesthetic at the base of the penis, where the nerves for pain are located.
- General anesthesia has a lot more risk than local, and isn't necessary for such a
- short procedure, however in cases > 1 year we may use general anaesthesia.

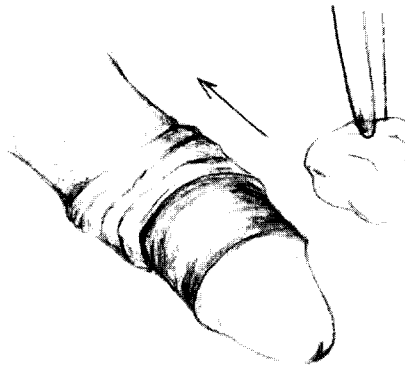


Techniques:**In infants****A) Bone cutting method:**

Applying a bone forceps across the prepuce distal to the glans with blind division is not preferred now (to see one boy with partial or total amputation of the glans is enough to realise the folly of this technique)

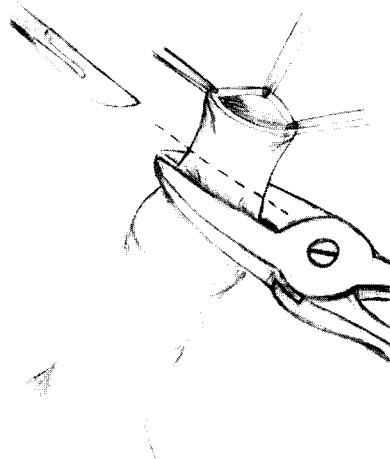
Position → on back with knee flexed & thighs flexed & abducted by an assistant.

- a- Widen the opening of the prepuce.
- b- Reduce the prepuce backwards (to expose postcoronal sulcus).
- c- Remove the smegma by Betadine sponge.
- d- Prepuce is retained to normal position.
- e- Squeeze the glans penis backwards.



N.B.: In fat young children, excessive suprapubic fat may carry abdominal skin over the shaft of the penis so it should be pushed firmly to the pubic symphysis before marking

- f- Apply the bone cutting distal to the glans & maintain for few minutes.



- g- Cut the skin.
- h- Control bleeding by ligation of frenal vessels (if needed).
- i- Cut ends are approximated with fine catgut.
- j- Apply gauze with tincture benzoin around the wound for 24 hrs.
- k- No Ab, simple analgesia is given.

N.B.: Avoid dressing by chemicals to avoid eczema.

Advantages:

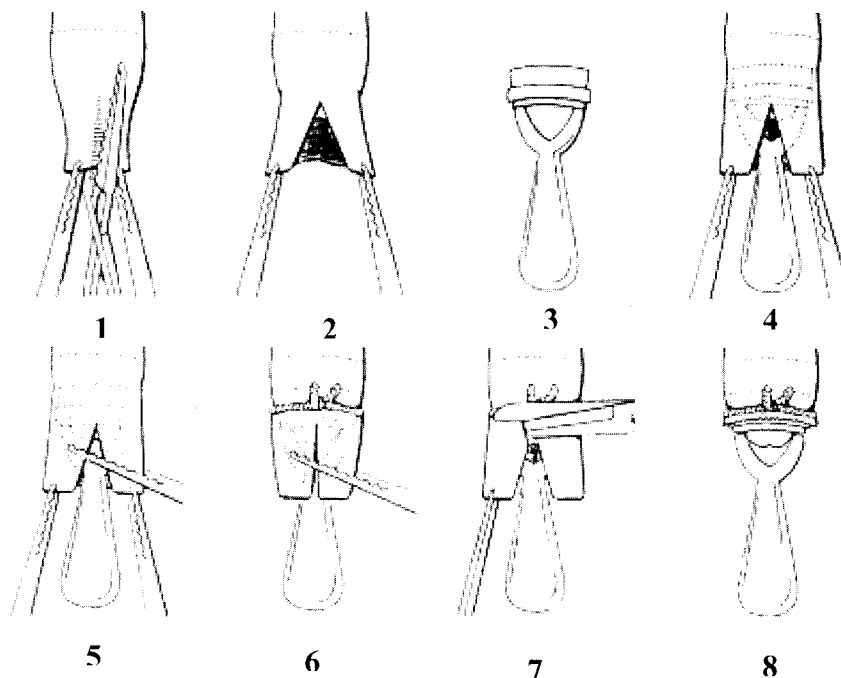
- Rapid.
- Better haemostasis.

Disadvantages:

- Bleeding.
- Under correction.
- Over correction.
- Injury of glans.
- Delayed healing.

B) Plastibell technique (Hollister device):

- The adhesions between glans & foreskin are divided with a probe.
- The foreskin is cut longitudinally to allow it to be retracted & glans to be expose.
- The plastibell is applied to the head & is covered over by foreskin (the plastibell comes in 6 sizes).
- A ligature is tied firmly around the foreskin.
- The excess skin protruding beyond the ring is trimmed of (finally the handle is broken of at the end of procedure).
- The ring falls off in 3 – 7 days leaving a circumferential wound that will heal over the following week.

**Advantages:**

- The glans is protected during this procedure.
- Homeostasis
- Cosmetically → there will be little to no scar
- Quik procedure
- Less discomfort to the baby & no bandage required.

Disadvantages

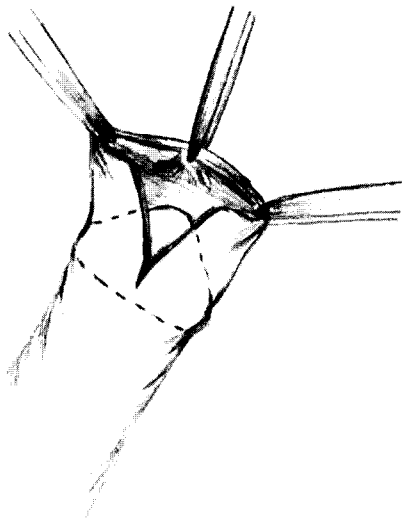
- Rarely the tip of glans may protrude through the ring & become swollen.
- Risks of infection or hemorrhage due to bell slippage.

In adults**Dissection method:**

- a, b, c, d. as bone cutting method.
e- Hold the opening of the prepuce by 2 artery forceps.



- f- Cut the prepuce till sulcus of glans penis.

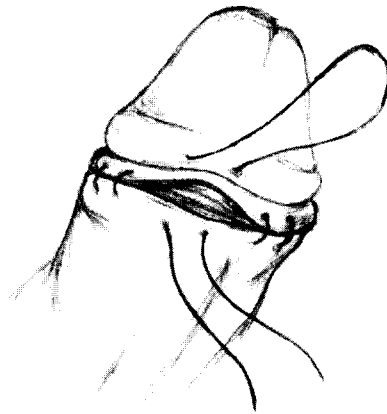


- g- Divide the prepuce all around.



- g-** Ligate the dorsal v. of the penis & frenal vessels (haemostasis)
Suture the skin to remnant of m.m. with 4 sutures.

(U-Shaped suture Is taken at the site of the phrenal vessel as shown in the diaphragm and is important site for the hemostasis)



h- As bone cutting method.

NB. Paraphimosis = Any constriction of the glans at the corona e.g.:



- 1- Prepuce (not in circumcised person).
- 2- Fibrosis.

➤ **References:**

- Brennae, Mark (June 13, 2007).
- Belly & love's 25th edition

possible oral questions

- 1-** What is main contraindication of circumcision?
- 2-** Why in hypospadias circumcision is contraindicated?
- 3-** What is frenal artery?
- 4-** What is phimosis?
- 5-** What are the complications of phimosis?
- 6-** What is plasibel (Hollister) method of circumcision?

Amputations

Indications:

→ Should be considered if part of the limb is:

1. Dead

- See causes of gangrene

2. Deadly

- When life of the patient is threatened if the limb is left.
- This occurs in the following conditions:
 - Malignant tumors: Osteosarcoma, soft tissue sarcoma infiltrating the bone & high grade giant cell tumors.
 - Crush injury that may lead to crush syndrome
 - Gas gangrene

3. Dead loss

- When affected limb is considered below an artificial limb or to no limb at all
- Amputation in these conditions improve the quality of life:
 - Severe rest pain
 - Severe lacerations & fractures that are not suitable for satisfactory repair
 - Severe contracture or paralysis

Types of amputation:

1. Provisional:

- This is done when 1^{ry} healing is unlikely to occur because of ischemia or infection
- Amputation is performed at the lowest possible site, so of amputation is needed again we can leave a stump of adequate length
- Free drainage should be provided by using one of these methods:
 - The guillotine method
 - Flap amputation without closure (better)

2. Definitive:

- This is done when 1^{ry} healing is likely to occur
- Amputation should be planned to provide an ideal stump
- There are two types of definitive amputation:
 - End bearing:
 - Performed when weight is taken through the end of the stump
 - The scar must not be terminal
 - The bone end must be solid not hollow (Must be cut through or near a joint)
 - Examples are: Through knee & Syme's amputation

- Non-end-bearing (Cone bearing):
 - This is the commonest variety
 - All upper limb and most lower limb amputations come in this category
 - The body weight is transmitted by way of artificial limb socket to structures other than the stump end.

Requirements of an ideal amputation stump:

A. Length:

- A short stump is liable to slip out of the prosthesis
- Non-end-bearing stump should be 3 inches shorter than the entire bone to give room for artificial joint

B. Shape:

- Should be smoothly rounded
- Shouldn't be bulbous or pointed

C. Coverings:

- Bone should be covered with subcutaneous tissues & deep fascia (To ensure mobility of skin)

D. Scar:

- Should be linear, freely mobile & not exposed to pressure

E. Function:

- Should be painless with freely movable joint above & smooth bone end below

Techniques of amputation:

A. Guillotine method:

- All tissues are divided at the same level
- Bone end is left exposed on the cut surface
- It's rarely used now days except in extreme emergencies

B. Oblique method:

- An oblique elliptical incision is made
- Its upper end is made above the level of bone section
- Its lower end is made lower than level of bone section by a distance equal to diameter of limb
- This method is used in Syme's amputation

C. Racket method:

- It's used in amputation of toes or fingers
- The proximal end of the incision is straight line (Like handle of the racket)
- The distal end is circular or elliptical (Like blade of the racket)

D. Flap method:

- The most popular method is to use flaps which maybe a single flap, two equal or unequal flaps

The following rules should be respected in making the flap

- The length of a single flap or combined length of two flaps should be equal to one & half times the diameter of limb at the level of bone section
- The width of the flaps should be equal to half the circumference of the limb **but** when unequal flaps are used the shorter flap should be broader than the other
- The flap should be semicircular rather than rectangular in shape (Conical rather than cylindrical is desired)
- Flap should consist of skin & deep fascia with some muscle tissue at their bases

Operative steps:

1. Get a consent from the patient
2. General or spinal anesthesia
3. A tourniquet is used unless there is arterial insufficiency
4. Anterior & posterior flaps of equal length are used in upper limb & for above knee amputation. In below knee amputation a long posterior flap is used.
5. Muscles are divided distal to the site of bone section, then the opposing groups are sutured over the bone end to each other & to periosteum thus providing a better muscle control & circulation.
6. Nerves are divided proximal to the bone cut
7. The main vessels are tied
8. The bone is cut across the required level after division of the periosteum. If two bones are present, divide the smaller one first.
9. The tourniquet is removed & every bleeding point is meticulously ligated
10. Deep fascia is closed
11. Skin is sutured without tension. (Suction drain is recommended)
12. Stump is firmly bandaged

Post-operative care:

1. Rest the stump on a pillow
2. Use suitable splints to prevent flexion deformity of the hip & knee joints
3. Avoid change of the stump dressings for 5-7 days unless excessive oozing occurs or signs of infection are clear.
4. Remove the drain 24-48 hrs. postoperatively
5. Remove skin sutures after 10-14 days
6. Do stump muscles & joint exercise with the help of supervised physiotherapy
7. Use crepe bandages or elastic stump stockings to achieve smooth conical stump.
8. Use a prosthesis.

The prosthesis

- Must fit comfortably
- Should function well & look good
- It is used once the stump is healed and conical & the scar is stable

Complications:**A. Early:**

1. Complications of any operation especially hematoma, infection & 2^{ry} hemorrhage.
2. Special complications:
 - a. Breakdown of skin flap: May be due to ischemia or suturing under excessive tension
 - b. Gas gangrene: Clostridia spores from the perineum may infect a high above knee amputation especially if performed through ischemic tissues.

B. Late:**1. Skin:**

→ Eczema, callosities, ulceration, redundancy & adherent scar.

2. Muscle:

→ Excess muscles left at the end of the stump gives sense of insecurity → may prevent the use of proper prosthesis

3. Artery:

→ Progress of arterial occlusive disease produces ischemia of the stump

4. Nerve:

→ Phantom limb: This is the conscious feeling of the missing limb which persists for sometime & then fades gradually. Patient may feel pain in phantom limb

→ Stump neuroma: Usually painless unless irritated by pressure

→ Causalgia: This is severe burning pain due to formation of artificial synapses between efferent sympathetic & afferent sensory fibers. It is relieved by sympathectomy.

5. Joint:

→ Joint above amputation may be stiff & deformed

6. Bone:

→ Formation of spur

→ Osteomyelitis & ring sequestrum

→ A projecting bone end may result from the use of short flaps or from continued growth of bone in children.

Lower Limb Amputation

Distal amputations:

A. Local toe amputation:

- In patients with toe gangrene
- The surrounding tissues have relatively good blood supply because it's due to disease of small-vessel.
- Local amputation of the toe may result in healing.

B. Ray amputation of the toe:

- Part of the metatarsal bone is excised.
- Recommended when metatarsophalangeal joint region is involved.

C. Transmetatarsal amputation:

- Indicated when several toes are affected & irreversible ischemia has extended to the forefoot
- A viable long planter flap is essential for satisfactory healing.

D. Syme's amputation:

- Is a disarticulation at the ankle with removal of malleoli & tibial articular surfaces
- It is very satisfactory provided that the circulation of the limb is good
- Disadvantages:
 - Prosthesis is ugly **AND** after 7-10 years reamputation is usually required as the stump is end bearing & results in ulceration, callosities & exostosis.

Major amputations:

A. Below the knee amputation:

- Most common amputation for vascular disease & infection
- 90 % of unilateral & 75 % of bilateral amputees learn to walk independently

Operative notes:

- Optimum length is 6 inches below the joint line or one hand breadth below tibial tubercle.

- At lower levels the circulation is poor & the bone is not well protected by soft tissue
- Stump shouldn't be shorter than 2 inches so it can be retained inside socket during flexion of knee.

- Done using a long posterior & short anterior flap (because blood supply of posterior flap is better than the anterior)
- Flap should include deep fascia.
- The calf muscles are included in the posterior flap
- The fibula is cut first & 1 inch higher than the tibia to obtain a conical stump
- Sharp anterior margin of the tibia should be beveled.

Syme's amputation is better than below knee amputation because:

- Less catastrophic to the patient
- Allows the patient to walk in his room without prosthesis
- Maintains the pleasure of earth feeling
- Requires a cheap stump boot known as "elephant boot"

B. Through the knee amputation:

→ Not popular because:

- Requirements are rarely available
- The end can't be fitted with a good artificial limb

C. Above the knee amputation:

→ Indications:

- Blood flow is inadequate for healing at lower level
- Patient is unable to walk because of other debilitating disease
- Serious infection making lower amputation impossible

→ Main advantage:

- Greater probability of healing

→ Main disadvantage:

- Ambulation following amputation has lower rate

→ Contraindications:

- Gangrene or ischemia at level of amputation

→ Preoperative preparation:

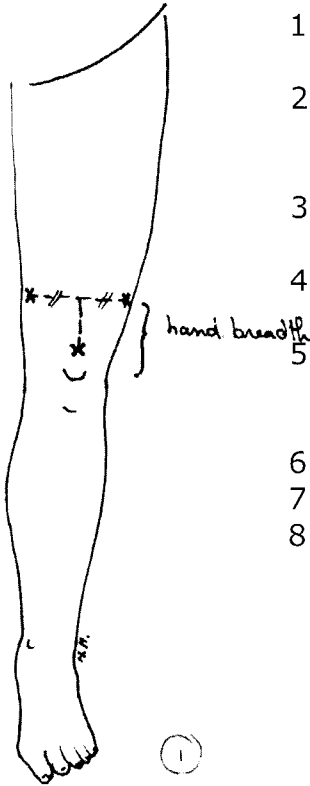
- Assess the viability of the skin flaps (no ischemia at that level).

→ Anesthesia:

- General / spinal anesthesia

→ Operative Steps:

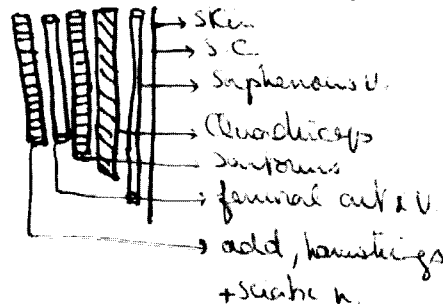
1- Skin preparation: → From lower part of the abdomen to upper part of skin covering the tibia.

2- Incision:

1. Mark the level of bone cutting with a marker (= a handbreadth above knee).
2. Encircle the thigh at that level with a thread (so the thread length represents the circumference of the limb at the level of bone cutting).
3. Cut the thread into 2 equal pieces (so each represent half the circumference of the limb at the level of bone cutting)
4. Fix one half of the thread at level of bone cutting by the use of 2 pins applied on both sides of the thigh.
5. The other half is re-divided into 2 pieces & this quarter is applied ant & post perpendicular to the middle of the half circle by 2 other pins.
6. Therefore 4 pins are applied to the thigh (1).
7. The incision is done along a thread passing through the 4 pins.
8. Therefore the incision equals 1.5 times as the circumference of the limb at the level of bone cutting.

3- Procedure:

1. Assess skin flaps bleeding for viability (no ischemia at this level) **(2)**

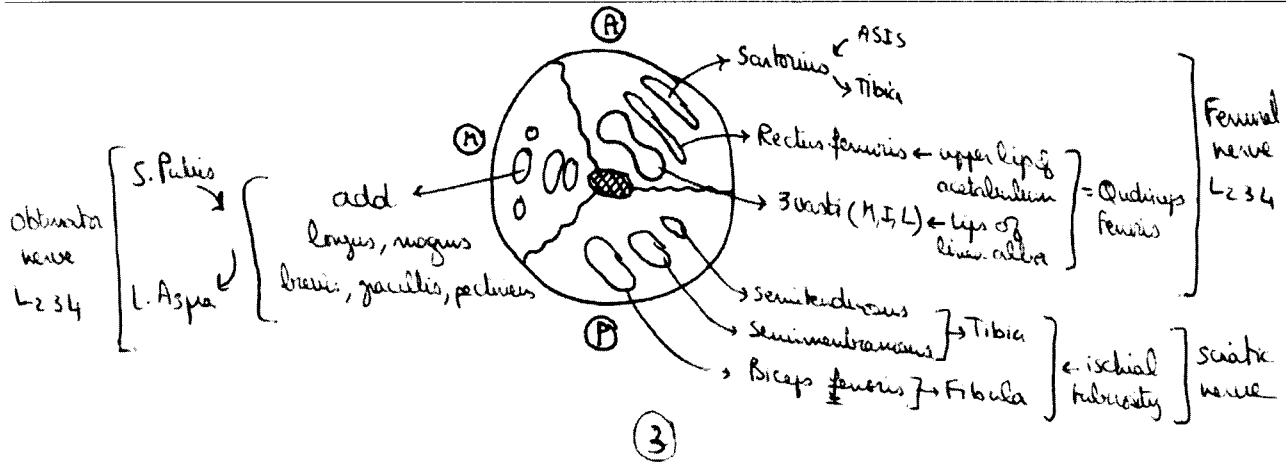


(2)

2. Ligate the long saphenous.
3. Deepen ant flaps through the quadriceps femoris to the femur & ligate all major muscular vessels
4. Cut the sartorius ms then ligate & divide the femoral art & v. separately
5. Divide the adductors (longus & magnus) then cut the sciatic n.

The sciatic nerve:

- Must be ligated (to avoid bleeding from the vasa nervosa)
- Must be cut as high as possible & with a very sharp knife (to avoid neuroma formation) (=painful stump).



6. Divide the Hamstrings (semimembranosus, semitendinosus & biceps femoris) posteriorly & ligate all bleeding muscular vessels (3).
7. Cut the periosteum & elevate it above the level of bone cutting (to avoid osteophytes formation) then cut the bone (femur).
Protect the muscle from bone fragment during sawing the bone by muscle guard (shield) to avoid formation of myositis ossificans).
8. Bone wax is applied if there is bleeding from bone marrow.

4- Closure:

1. Absolute haemostasis.
2. Put a drain for 48 hrs.
3. Myoplasty:
 - Suture adductors to vastus lateralis over the femoral stump loosely.
 - Suture superf. Quadriceps to hamstrings with loose absorbable sutures (e.g. chromic cat gut or vicryl).
 - Close deep fascia of ant & post flaps.

- Ideal length is 11 inches from tip of greater trochanter & the minimum is 6 inches.
(At higher levels sufficient adductor power is not preserved)
- Amputation can be carried out through equal or unequal anteroposterior flaps

D. Hip disarticulation:

- Rarely indicated
- Very difficult to fit with a prosthesis
- Main indication in malignant disease

E. Hindquarter amputation (Hemipelvectomy):

- Only performed for malignant disease
- Classic operation involves removal of the entire lower extremity & varying amount of pelvic bone

Upper Limb Amputation

Distal amputations:

A. Partial finger amputation:

- Carried out through the phalanx or interphalangeal joints using single palmar flap

B. Complete finger amputation:

- Usually combined with excision of metacarpal head → To minimize the deformity & enable the fingers to be flexed closely
- Dorsal racket incision is made with:
 - Blade: Encircling the root of the finger
 - Handle: Lying on the dorsum along the metacarpal bone
- The phalanx is disarticulated & the metacarpal head is excised

C. Thumb amputation:

- Preservation of any part is the rule
- If the metacarpal is the only thing left, the web between it & the index is deepened by incision to create a new thumb.

The thumb represents 50% of the function of hand.

D. Hand amputation:

- No formal amputations are described because the smallest stump is better than any artificial hand
- The rule is to preserve the hand as much as you can

E. Wrist amputation:

→ Better than higher amputation because:

- Allows the most possible pronation & supination
- Provides better prosthetic control

Major amputations:**A. Below the elbow amputation:**

- Optimum length is 7 inches from the tip of the olecranon
- Equal anteroposterior flaps are done to obtain a terminal transverse scar which won't be drawn up between the two bones.

Even if only a short stump can be achieved, forearm amputation is better than above elbow amputation

B. Disarticulation of the elbow:

→ Carried out through either:

- Single posterior flap
- Equal anterior & posterior flap

C. Above the elbow amputation:

- Optimum length is 8 inches from the acromion process

Even if a very high amputation is necessary, the head of the humerus should be spared since it serves as a support for a prosthesis & maintains shoulder width

D. Disarticulation of the shoulder:

- Rarely indicated

E. Forequarter amputation:

- Indicated for malignant tumors
- Operation includes removal of whole upper limb with the shoulder girdle.

Possible oral questions?

- 1- What is the difference between amputation and disarticulation?
- 2- What are the principles of selection of site of amputation?
- 3- What is phantom limb?
- 4- What are characters of ideal stump?
- 5- What is syme's amputation?
- 6- What are different methods of amputations?
- 7- What are complications of amputations?

Chest drain insertion**I- Indications:**

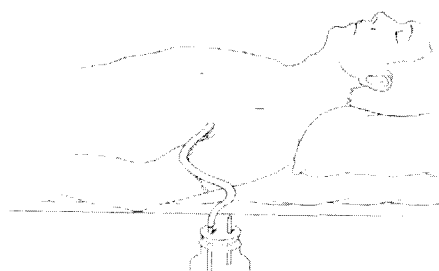
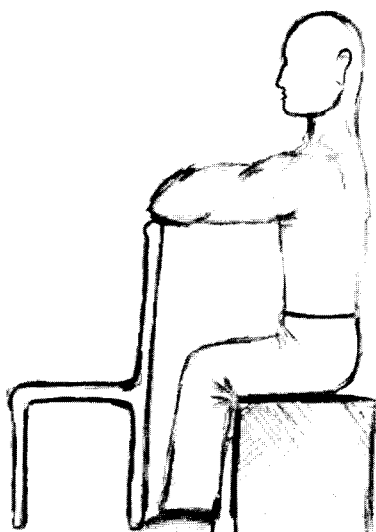
- Pneumothorax .
- Haemothorax.
- Post-thoracotomy.

II- Equipments:

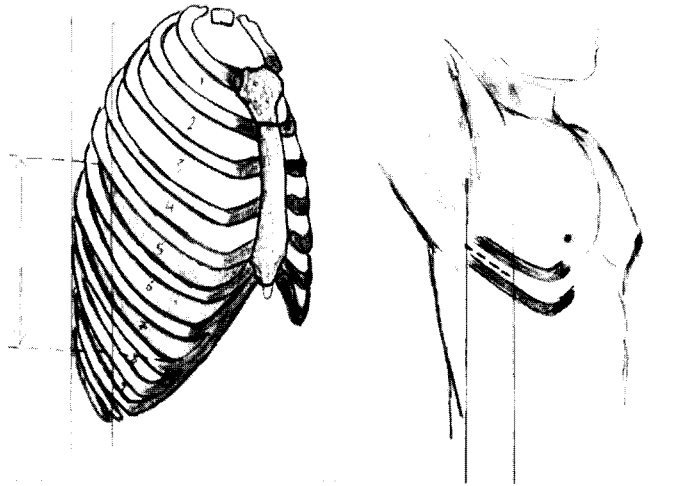
- Dressing pack.
- Gloves.
- Antiseptic.
- Lignocaine.
- 10 ml syringe plus 21G and 25G needles.
- Scalpel.
- 29G chest drain and collecting set (underwater seal)
- 1 /O silk suture.
- Dressing and tape.

III- Preparation:

- Check CXR and confirm patient's clinical findings.
- If possible, Position the patient appropriately, sitting on a stool or the edge of the bed with arms folded over a bedside table is ideal.

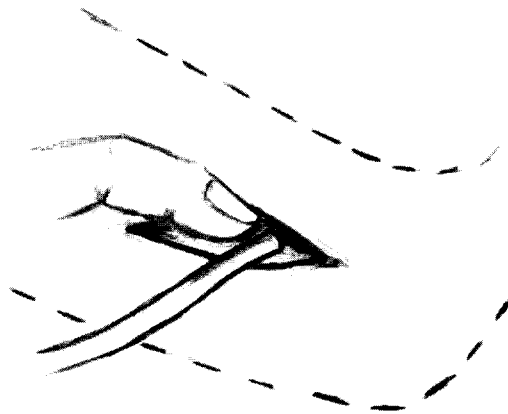


- Identify the appropriate intercostal space prior to starting.
- A point in the fifth to seventh intercostal spaces between the mid-axillary and anterior axillary lines is most appropriate for chest drain insertion.

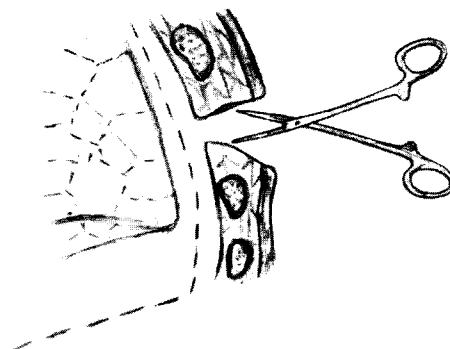


IV- Method

- Clean the area of proposed drain insertion thoroughly and place sterile drapes.
- Infiltrate the skin and subcutaneous tissue down to the pleura at the site of insertion with local anaesthetic.
- Make a 2-3 cm incision through the skin (large enough to accommodate your finger plus the drain) parallel to the ribs in the appropriate intercostal space and deepen the incision to muscle.

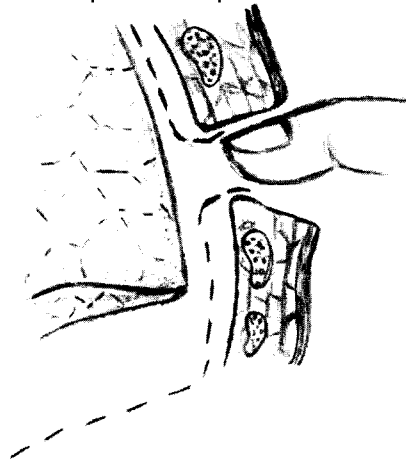


- Separate the muscle fibers apart with artery forceps to expose the pleura.

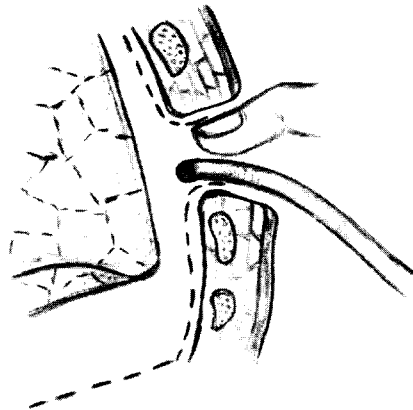


1- Insertion of an intercostal drain

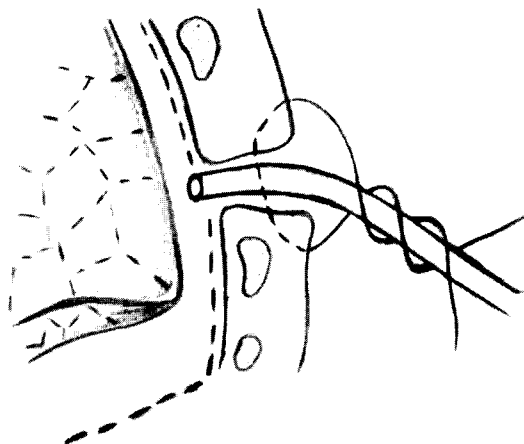
- Pierce the pleura with the artery forceps and introduce a finger to confirm entry to the pleural space.



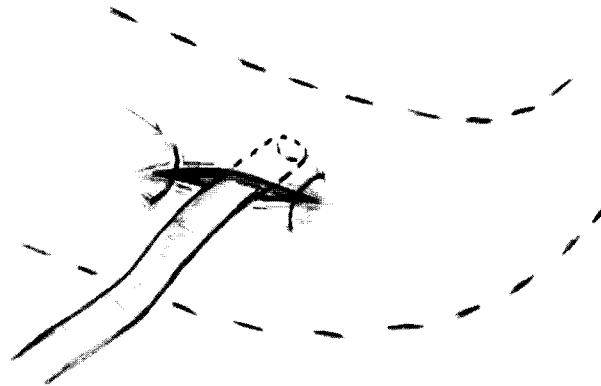
- With the guiding finger still in place, introduce the chest drain into the pleura! space and direct into place.



- Place two loose sutures across the wound to allow easy closure when the drain is removed.



- Suture the drain in place with a suture placed through the skin and then tied multiple times around the drain itself. Apply a sterile, preferably translucent, dressing over the drain.



- Attach drain securely to underwater seal arrangement and ensure the fluid in the tube swings with respiration.
- Always obtain a CXR to confirm the position of the drain and the progress of the condition for which the drain was inserted.

2- Tips and problems

- Agitated or anxious patients: a small dose of IV opiate may help. Ensure the drain is well secured to the chest wall and the underwater seal tubing. This will hopefully avoid the drain becoming dislodged accidentally.
- Do not clamp the drain. This can be potentially dangerous. As long as care is taken to ensure that the underwater seal arrangement is kept below the level of the patient, there will not be a problem, even on transferring the patient.
- If there is no simple answer to the problem, then the tube will need to be replaced through a fresh incision.
- Persistent bubbling: there may be a broncho-pleural fistula. Ask for expert help.

3- Chest drain removal

- Many patients find this procedure uncomfortable and use of an IV opiate often aids removal. A small number of patients may need light sedation, e.g. small dose IV midazolam (Note: Need for appropriate monitoring during sedation.).
- Equipments:
 - Gloves.
 - Forceps.
 - Gauze swabs.
 - Tape.
- Method:
 - Remove dressing and sutures holding drain in place.
 - Ask patient to hold breath in full inspiration as the drain is removed.
 - Close the wound by tying the two loose sutures

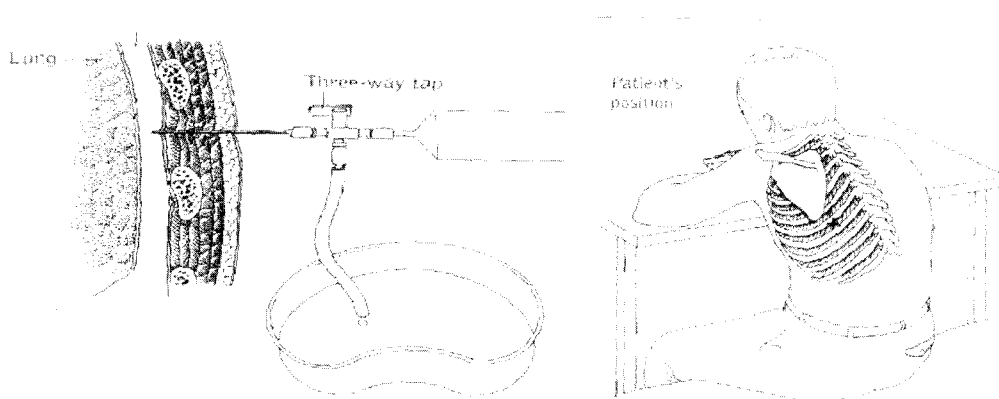
Pleural Aspiration

Indications:

- Drainage of pleural effusion.
- Drainage of early empyema.

Equipments:

- Dressing pack.
- Pleural aspiration set.
- Gloves.
- Local anaesthetic.
- 60 ml syringe with lock and three-way tap.
- Iodine cleansing solution.



Preparation:

- Check CXR together with the patient's clinical findings.
- Position the patient appropriately, sitting on a stool or the edge of the bed with arms folded over a bedside table is ideal.
- Identify the appropriate intercostal space prior to starting procedure. A. point in the seventh intercostal space between the mid-axillary and posterior axillary lines is usually best.
- Ensure all equipments are present and functioning prior to starting.

Method:

- Clean a wide area of the chest around the aspiration site.
- Infiltrate the skin and subcutaneous tissues down to the pleura with lignocaine.
- Attach aspiration needle or cannula to the three-way tap and syringe which is attached to the drainage bag.
- Introduce the needle slowly (above the appropriate rib, as the neuromuscular bundle lies under it)
- For a diagnostic tap, remove approximately 20 ml of fluid for culture, and cytology.
- for a therapeutic tap, continue to aspirate until fluids no longer exists or you have removed up to 1.5 liters.
- Remove the needle and apply a dressing over the site.

Problems:

- **Diagnostic taps:** should be done early in the morning if possible as cytology specimens must be processed quickly. The cells may degenerate rapidly if left overnight.
- **Dry tap:** the effusion may be loculated or an empyema may be organized. Aspiration under ultrasound guidance maybe needed.
- **Pneumothorax:** can complicate the procedure. Obtain urgent chest X-ray. The patient may need a chest drain.
- **Very bloody tap:** an intercostal vessel may have been punctured. Keep the patient on regular observations and repeat the CXR.
- **Marking the proposed site:** a fingernail or five pence coin pressed firmly onto the skin prior to preparing the skin will allow easy identification once drains have been placed.

Sympathectomy

I- Indications

📖 *Where direct arterial surgery is not technically applicable i.e. cases of distal occlusions with no run-off.*

1. **Buerger's disease:** Vaso-occlusive disease → sympathectomy only improves collaterals
2. **Raynaud's disease:** Vaso-spastic disease → sympathectomy gives better results than in Buerger's.
3. **Other indications:**
 - a. **1-hyperhydrosis.**
 - b. **2-Causalgia.**
 - c. **3-Intractable upper abdominal pain.**
 - d. **4-Others: intractable angina.**

II- Contraindications

1. Atherosclerosis except with tissue loss → improve collaterals → improve healing (done in combination with direct arterial surgery).
2. Diabetics as the patient is already suffering from neuropathy → sympathectomy is of no use.
3. Contraindications for thoracoscopy:
 - a. Pleural adhesions.
 - b. Previous thoracotomy or intercostal tube.
 - c. Inability to tolerate one lung anaesthesia (COPD, contralateral pneumonectomy).

III- Types

1. Ischemia of UL → **Dorsal sympathectomy:**
 - T2,3,4 are transected.
 - T1 (or Stellate ganglion) is left to avoid Horner's syndrome.

Types:

- Open (supraclavicular - posterolateral - transaxillary)
- Thoracoscopic

Complications of dorsal sympathectomy:

- 1- Horner syndrome.
- 2- Post sympathectomy neuralgia.
- 3- Post sympathectomy compensatory sweating.
- 4- Fantom limb.
- 5- Gustatory sweating.
- 6- Recurrence.

2. Ischemia of LL → **Lumbar sympathectomy**
 - L2,3,4 are transected .
 - L1 is left to avoid retrograde ejaculation.

IV- Disadvantage

- 1) **Redistribution of blood** → ↑ blood supply to skin & ↓ blood supply to muscles → claudication pain.
- 2) **Recurrence**: after few years due to hypersensitivity to circulating catecholamines = denervation hypersensitivity

Bowel preparation**Mechanical preparation options:**

- 1- Dietary restriction: clear fluid for 1-3 days.
- 2- Cathartics: stimulate bowel evacuation.
- 3- Enemas: (Saline – soap – tap water)
- 4- Oral lavage:
 - a. Saline
 - b. Mannitol.
 - c. PEG (Polyethylene glycol)
- 5- Intraoperative lavage.

Antibiotic preparation:

- 6- Luminal antibiotic (Neomycin – Flagyl)
- 7- Prenteral antibiotic.

Right hemicolectomy

Aim: Removal of primary tumour and its draining lymph nodes.

Bowel preparation: see before.

Steps:

- 1- Midline incision.
- 2- Assessment of the tumour for resectability.
- 3- Exploration of the abdominal cavity.
- 4- The peritoneum lateral to the colon is incised and the incision is advanced around the hepatic flexure (White line).
- 5- The right colon is elevated with the peritoneum containing its vessels, lymph nodes from the posterior abdominal wall (take care not to injure 1- The ureter 2- Gonadal vessels 3- The duodenum)
- 6- Devascularization by ligation of ileocolic artery and right colic artery.
- 7- Structures removed are: Caecum, ascending colon, hepatic flexure, proximal 1/3 of transverse colon and the last 30 cm of ileum.
- 8- Anastomosis between ileum and transverse colon end to end.
- 9- Drain.
- 10- Closure in layers.

Anterior Resection

Bowel preparation: see before.

Position of the patient: lithotomy Trendelenburg's position.

Step:

- 1- Midline incision.
- 2- Exploration of abdominal cavity.
- 3- Initial incision of visceral peritoneum lateral to the left colon extending upward till splenic flexure and downward till the pelvis.
- 4- Ligation and division of inferior mesenteric vessels.
- 5- Mobilization of mesorectum, rectum and tumour.
- 6- Posterior dissection (Waldyer's fascia)
- 7- Lateral dissection.
- 8- Anterior dissection.
- 9- Anastomosis:
- 10- Hand sewen.
- 11- Stapler.
- 12- Defunctioning stoma.

Complications:

- 11- Anastomotic leakage.
- 12- Anastomotic stricture.
- 13- Local recurrence.

Ileostomy

Indications: Proctocolectomy for ulcerative colitis or familial polyposis coli

Types:

1. Conventional ileostomy:

- Stoma is fashioned so that the nipple of ileum protrudes from the skin facilitating direct delivery of irritant small bowel content into an appliance
- Conventional ileostomies are incontinent.

2. Continent ileostomy:

- May be done by fashioning a valve with an underlying reservoir (Kock pouch) which the patient regularly evacuates by passing a tube

Colostomy

Definition: surgical opening in the colon to outside (the skin).

Indications:

Temporary colostomy:

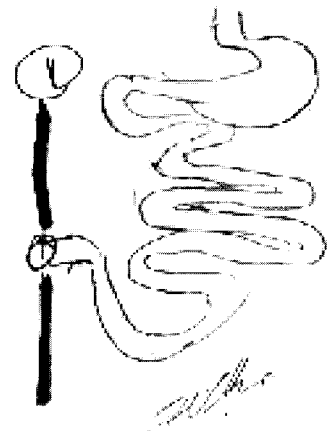
- 1) To relieve large bowel obstruction in patients with:
 - a. High anorectal malformations
 - b. Hirschsprung's disease
 - c. Inflammatory stricture
 - d. Carcinoma of the colon

After relieve of the obstruction, the colon is prepared & cause is corrected. Later, the colostomy is closed. (Three stage management of acute colon obstruction)

- 2) Injuries of the colon. The injured segment is either exteriorized as a colostomy, or is closed & a proximal diverting colostomy is performed
- 3) To protect a distal doubtful colonic or rectal anastomosis.

Permanent colostomy:

- 1) After abdomino-perineal resection
- 2) Irresectable carcinoma of the large bowel with obstruction
- 3) Incurable cases of anal incontinence
- 4) High anal fistulae that is not amenable to surgery



Types:

- 1) Terminal colostomy: = end colostomy

e.g. with A.P resection of the rectum

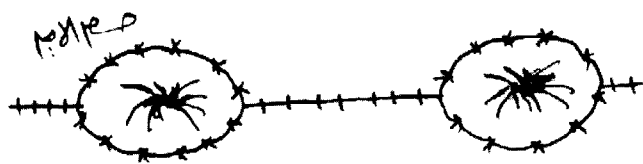
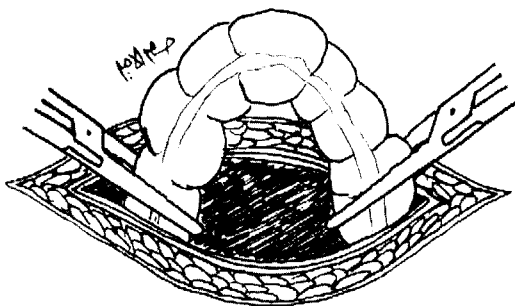
- The proximal cut end is exteriorized & sutured to the skin.
- The distal end is removed.

- 2) Simple loop colostomy:

Done in mobile (or mobilized colon).

e.g - sigmoid, - transverse (Rt side).

- 3) Double-barrel colostomy:



- 4) Caecostomy: (open -tube).

- 5) Appendicostomy.

Colostomy care:**(1) Iliac colostomy:**

- i. Easy to manage as by time it functions once or twice a day.
- ii. The patient usually uses a colostomy appliance & evacuates its plastic bag when it is full
- iii. An alternative method is to wash out the colon through the colostomy once every morning
- iv. As the colostomy doesn't act during the rest of the day, a simple dressing is all that is necessary

(2) Transverse colostomy:

- i. It is wet

Complications of colostomy:

- (1) Obstruction of the opening. E.g fecal mass – skin stenosis – scarring – loop kink.
- (2) Retraction.
- (3) Prolapse.
- (4) Incisional paracolostomy hernia.
- (5) Internal hernia & may be strangulation via paracolic gutter.
- (6) Peritoneal soiling.
- (7) Necrosis of distal end

Gastrostomy

Definition:

- This is an insertion of a feeding tube into the stomach.

Description:

- This is often done through endoscopy (a long tube placed through the mouth into the stomach) by a gastroenterologist. Local anesthesia and intravenous sedation are used.
- It may also be done surgically. While the patient is deep asleep and pain-free (general anesthesia), a small incision is made on the left side of the abdomen. A small, flexible, hollow tube (catheter) with a balloon or flared tip is inserted into the stomach. The stomach is stitched closed around the tube and the incision is closed.

Indications:

- Gastrostomy tubes are inserted for various reasons. They may be needed **temporarily** or **permanently**. Gastrostomy tube insertion may be recommended for:
 - Birth defects of the mouth, esophagus, or stomach (esophageal atresia or tracheal esophageal fistula).
 - Patients who cannot swallow correctly.
 - Malnourished patients who cannot take enough food by mouth to maintain their nutrition.
 - Patients who continually aspirate when eating.

Risks:

- Risks for any anesthesia are:
 - Reactions to medications.
 - Problems breathing.
- Risks for surgical or endoscopic feeding tube insertion are:
 - Bleeding.
 - Infection.

Expectations after surgery:

- This is a relatively simple surgery with a good prognosis.

Convalescence:

- The stomach and abdomen will heal in **5 to 7 days**. Moderate pain can be managed with medications.
- Feedings will start slowly with clear liquids and gradually be ↑.

The patient/family will be taught:

- How to care for the skin around the tube.
- Signs and symptoms of infection.
- What to do if the tube is pulled out.
- Signs and symptoms of tube blockage.
- How to empty (decompress) the stomach through the tube.
- How and what to feed through the gastrostomy tube.
- How to conceal the tube under clothing.
- What normal activities can be continued.

Tracheostomy

Definition:

- A tracheostomy is an opening surgically created through the neck into the trachea (windpipe). A tube is usually placed through this opening to provide an airway, and to remove secretions from the lungs. This tube is called a tracheostomy tube or trach tube.

Description:

- I. Anaesthesia: general, in absence of upper respiratory obstruction.
- II. Position: supine.
- III. Incision:
 - Vertical midline or horizontal incision.
- IV. Steps:
 - Cut platysma, superficial fascia & deep fascia.
 - Incise the trachea & insert tracheostomy tube.

Types

- High tracheostomy (in 1st & 2nd tracheal rings).
- Mid-tracheostomy (in 3rd & 4th tracheal rings).
- Low tracheostomy (in 5th & 6th tracheal rings).

N.B: Mid tracheostomy is the operation of choice.

Indications:

- ***A tracheostomy may be performed because of:***
 - An inherited abnormality of the larynx or trachea.
 - Severe neck or mouth injuries.
 - Breathing corrosive material smoke or steam.
 - A large object blocking the airway.
 - Paralysis of the muscles that affect swallowing.
 - Long-term unconsciousness or coma.

Risks:

- The risks for any anesthesia are:
 - Reactions to medications.
 - Problems breathing.
- The risks for any surgery are:
 - Bleeding.
 - Infection
- Additional risks include:
 - Erosion of the trachea (rare)
 - Scar tissue in the trachea

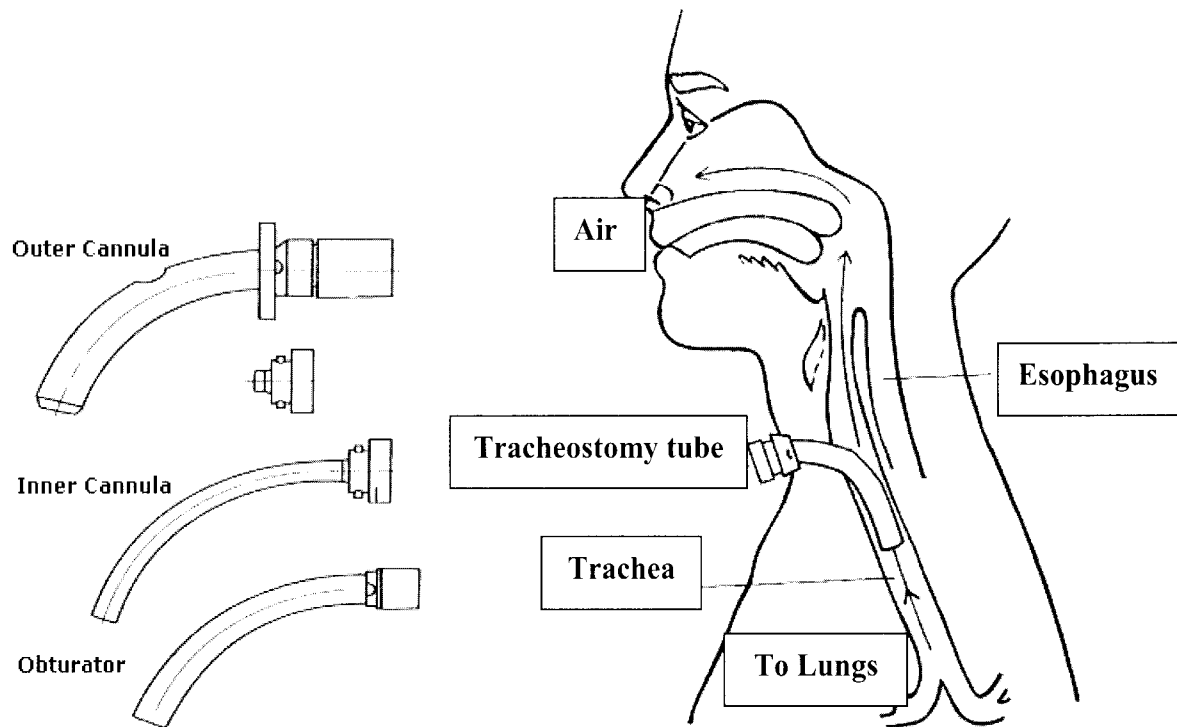
Expectations after surgery:

- ***In temporary tracheostomy***, the tube will eventually be removed. Healing will occur quickly, leaving a minimal scar.
- ***In permanent tracheostomy***, the hole remains open and may require surgical closure when no longer needed.

Post operative care:

- **Position**: semisetting.
- **Humidification**: by steam inhalation.
- **Antibiotic**: to avoid 2ry infection.
- **Observation of**: bleeding & respiration.
- **Bronchial toilet**: repeated suction of bronchial secretion.

- **Tube toilet.**
- **Extubation:** when the patient can live with tube corked for 1-2 days (weaning)



Submandibular Sialoadenectomy

Indications:

- Chronic sialadenitis.
- Stone gland (or recurrent stone duct).
- Part of other op. as commando's operation.

Anaesthesia: General.

Position:

- 1- The patient lies in supine position.
- 2- The neck is extended.
- 3- The head turned away from the surgeon.

Incision:

- Starts near mid line till angle of mandible 3 cm below ramus in upper skin crease, infiltration with lidocaine & epinephrine around the incision.
- Divide skin, S.C, Platysma in the same line & reflect flaps (to avoid cervical branch of facial).

Steps:

- 1- Ligate facial vein on the superficial surface of the gland.
- 2- Ligate Facial artery on post. border as it enter the gland then ligate it again when it comes anterior from the gland.

- 3- Freeing superficial lobe from mylohyoid → deliver deep lobe & dissect & avoid injury o lingual n. above & Hypoglossal n. below.
- 4- Double ligation & division of duct.
- 5- Close in layers with S.C drain.

Complications:

- As usual + injury of:
 - 1- Cervical branch of VII.
 - 2- XII.
 - 3- Lingual nerve.
- Injury of lateral pharyngeal wall.

Superficial Conservative Parotidectomy**Indications:**

- 1- Benign tumour of superficial lobe.
- 2- Recurrent attacks of inflammation.
- 3- Multiple stones of the gland.
- 4- Intractable parotid glandular fistula.

Pre operative preparation:

- 1- Shaving
- 2- Consent: Possibility of facial nerve injury.

Position: as submandibular gland.

Anesthesia: hypotensive anesthesia (Avoid muscle relaxation).

Incision: Y-incision.

Steps:

- 1- skin flap is raised in the plane of preparotid fascia till the anterior border of the gland. Posteriorly till sternomastoid muscle.
- 2- Identification of facial nerve:
 - a. Identification of the trunk: after exit from stylomastoid foramen and before entering the gland.
 - b. Identification of mandibular branch: at the lower border of the gland accompanied by retromandibular vein.
 - c. Buccal branch: runs along parotid duct.
- 3- Once the facial nerve is identified, the superficial lobe of the gland can be exteriorized by opening the plane superficial to the nerve.
- 4- In deep conservative parotidectomy: the branches of the facial nerve are mobilized and lifted on a nylon tape to enable the deep lobe to be freed.
- 5- Blood pressure is returned to normal, and bleeding points controlled.
- 6- Drain.
- 7- Closure of subcutaneous tissue and skin.

Complications:

- 1- Neurapraxia.
- 2- Anesthesia of ear lobule due to injury of great auricular nerve.
- 3- Gustatory sweating = Frey's syndrome.
- 4- Salivary fistula.
- 5- Hemorrhage.
- 6- Recurrence.

Vascular exposure

Indications:

- 1- To control hemorrhage or repair injury.
- 2- To ligate or perfuse cytotoxic.
- 3- Before removing organ e.g. spleen.
- 4- To treat ischemia → e.g. embolectomy.

1- Exploration of common carotid artery:

- Patient lies supine, face turned to opposite side.

Incision:

- On ant. border of Sternomastoid at level of cricoid cartilage (in skin crease).
- Open skin - S.C- platysma & retract Sternomastoid back & omohyoid down → open carotid sheath (preserve ansa cervicalis).

2- External carotid artery:

Position & incision:

- On anterior border of sternomastoid but at level of upper border of thyroid cartilage.
- Open skin – S.C. tissue – platysma & ligate ext. jugular & facial veins.
- Retract epigastric m. up & retract XII.

3- Subclavian artery:

- As sympathectomy

Incision: above clavicle (8 cm in length).

- Open skin, S.C. tissue, platysma & deep fascia.
- Divide clavicular head of Sternomastoid & scalenus ant. retract phrenic n. → expose artery & brachial plexus.
- Push Sibson fascia down → sympathectomy.

4- Brachial artery:

Middle part:

Position: Forearm over side table.

Incision: on middle aspect of Biceps.

Dissect artery with vena comitants from median n.

Terminal part:

Transverse incision in skin crease of cubital fossa medial to Biceps tendon & divide Bicipital aponeurosis.

5- External iliac artery:

Incision: 2cm above lateral 1/2 of inguinal Ligament:

- Open inguinal canal → retract cord up.
- Divide fascia transversalis lat. Ti internal ring → peel peritoneum up → you will see it.

6- Popliteal artery:

Upper part: رجل المريض مثنية زاوية قائمة

Incision: → lower 1/3 thigh parallel to adductor magnus.

Retract → adductor magnus → forward.

→ sartorius & semi-membranosus → back.

Lower part: patient is prone

- Incision between the 2 heads of gastrocnemius vertically = follow short saphenous to popliteal vein & retract vein & tibial n. & dissect fascia till popliteal artery

Rib Resection

Indications:

- 1- Rib disease (T.B, Tumors...) or cervical rib.
- 2- Cardiothoracic operations.
- 3- Abdominal operations e.g Subphrenic abscess.

Types:

A- Intra-periosteal (resected within its periostium):

- In rib disease & cervical rib.

B- Extra-periosteal:

- 1- H-shaped incision of ant. periosteal & elevate by periosteum elevator.
- 2- Dissect post. periosteum by rib raspatory (from below).
- 3- Divide the rib by rib shear.

Swellings

Lipoma:

- Incise skin (crease).
- Open S.C tissue & false capsule.
- Enucleate (finger) in the plane of cleavage & ligate feeding vessel.
- Close with or without drain.

Sebaceous cyst:

- Transverse ellipse including punctum dissect (blunt & sharp) & remove it
- **In scalp** → avulsion.

Venous Cut Down

Indication: in difficult cannulation in shocked patient.

Site: Done on any vein e.g great saphenous.

Cephalic – basilic are the most common.

Procedure on great saphenous vein:

- Open skin & S.C tissue over medial malleolus → ligate distally → put & fix cannula proximally

Hydrocele

Anaesthesia:

- General anaesthesia or spinal.

Position: supine.

Steps:

- 1- Grasp scrotum & make Hydrocele tense.
- 2- Antero lateral transverse incision.
- 3- Open skin, S.C & dartos muscle.
- 4- Dissect coverings (ext. spermatic fascia – cremasteric m. & internal spermatic fascia)
- 5- Deliver hydrocele sac & open it anteriorly.

A- If tunica is thick & calcified:**Subtotal excision:**

→ Excise tunica near its reflexion at Epididymis & cauterize the edge (or continuous suture) for hemostasis.

B- If tunica is thin & healthy:**1- Eversion: (Jaboulay operation)**

Tunica is everted & sutured behind epididymis so any fluid → absorbed by scrotal lymphatics.

2- Plicaton: (Lord's operation): about 5 plicating sutures.

- 6- Replace with testis & close with drain.

Complications:

- A- Operative: non.
- B- Post-operative: hematoma – infection.
Rrecurrence → especially after eversion.

NB: tapping is not used as it may lead to haematocoele, pyocoele or recurrence

Varicocele

Indications:

- 1- Failure of medical treatment (severe symptoms that can not be tolerated)
- 2- Complications:
 - a- Subfertility.
 - b- Recurrent thrombophlebitis.
 - c- Failure of medical commission.
 - d- Neurotic patient.

Types:**A. Microscopic sub-inguinal approach (Mark Goldstein):**

- The most commonly used approach.

❖ Steps:

- Anterolateral incision in the scrotum.
- The testis is delivered to isolate and divide gubernacular and external spermatic veins.
- After testis is returned to the scrotum, spermatic cord is elevated with ligation of dilated internal spermatic veins (under operating microscope).

❖ Advantages:

- Direct approach to spermatic cord.
- Small incision.

- Less postoperative pain as there is no incision of apponeurosis.

B. Inguinal approach (Modified Ivanissevich and Gregorini):

❖ **Steps:**

- Inguinal incision 5-10 cm.
- The spermatic cord is exposed and dissected.
- All dilated internal spermatic veins are ligated.
- The cord is elevated with ligation of external spermatic veins (running parallel to spermatic cord).

❖ **Advantages:**

- Low incidence of varicocele recurrence.

❖ **Disadvantages**

- Hydrocele formation (7%).
- It weakens the inguinal canal and may lead to inguinal hernia.
- Testicular artery injury.

C. Retroperitoneal approach (Palomo):

❖ **Steps:**

- Incision at the level of internal inguinal ring
- Splitting of muscles of anterior abdominal wall
- Exposure and ligation of internal spermatic vein retroperitoneally near the ureter

❖ **Advantages:**

- Testicular artery has not yet branches at this level, and is distinctly separated from internal spermatic vein
- Isolating the internal spermatic vein at the level where only one or two large veins are present.

❖ **Disadvantages:**

- High incidence of recurrence due to presence of collateral vessel that may bypass area of ligation.
- Injury of testicular artery and lymphatic (as they can not be delivered into the wound at this level)

N.B. What is embolization of varicocele?

N.B. What are the causes of recurrent varicocele?

- 1- In many cases dilated vessels due to cremasteric vein defect.
- 2- If bilateral varicocele, if we treat one side as both sides are communicating.

Undescended Testis

Indications: At the age of 1 year → in unilateral cases

→ bilateral with failed hormonal TTT

Incision: Inguinal incision.

Steps:

- Dissect testis & cord.
- Herniotomy for associated hernia.
- We can ligate & divide anything in the canal except vas & its vessels:
 - Cord coverings.
 - Pampiniform plexus.
 - Testicular artery.
 - Inferior epigastric artery.
- Introduce index finger in internal ring & dissect vas & vessels in the retro-peritoneum
- If the testis is not reaching the scrotum → (Fowler-Stephen): testis is mobilized on a pedicle containing ves & its artery.

- Microvascular anastomosis between distal end of testicular artery & inferior epigastric artery.

Orchiopexy:

- Bevan.
- Benson (pouch).

N.B: If patient is adult with testicular atrophy → orchiectomy

Prostatectomy

1- Supra-pubic transvesical (Freyer's):**2- Steps:**

- Incise bladder mucosa over the adenoma by cautery (to facilitate enucleation).
- Put index finger in the internal meatus & push anteriorly → till reaching the plane between adenoma & surgical capsule → dissect circumferentially removing the adenoma.
- Remove V-shaped wedge from the post. margin of U.B.
- Control bleeding from bed Harries transfixing stitches (boomerang needle) cover by mucosa of post. lip of meatus to urethral mucosa).
- Remove the shelf of the bed (or excise the shelf).
- Inflate 3-way Foley's catheter in the bed.
- Close bladder 2 layers.
- Drain the cave of retzius.
- Ligate Vas bilaterally (or not) to avoid post. op. epididymorchitis.
- Wash bladder with (glycine) post. operatively (NOT saline).

3- Retropubic prostatectomy: (Millen's):**4- Perineal prostatectomy:****Not done as causes:**

- Perineal urinary fistula.
- Injury of external urethral sphincter.

Complications of prostatectomy:**1- Operative:**

- 1ry Hge (control bleeding).
- Injuries:
 - Membranous urethral (retropubic).
 - Sphincter (TURP).

Incontinence.

2- Post-operative:

- Reactionary Hge :
(TTT of blood transfusion + wash + pull on Foley's → if failed → re-exploration & secure).
- 2ry Hge: (TTT antibiotics) + a
- Sterility: (due to retrograde ejaculation).
- Stricture urethra (TTT is dilatation).
- Suprapubic fistula (Stricture – shelf).
- Infection (bladder – bed – epididymorchitis).
- Osteitis pubis:
 - Occurs 3 weeks later due to infection in the cave or trauma to the periostium → waddling gait & tender pubis.
 - X-ray: wide symphysis + osteoporosis.
 - TTT:
 - Corticosteroids.
 - Incision (posteriorly) → curettage & dilatation → antibiotic beads.

How to drain abscess

A. Pyogenic abscess:

- There are two techniques:

Closed technique:

- Deep abscess can be treated by ultrasound or CT guided aspiration.
- Success can not always be guaranteed.
- Multiloculated abscesses may not drain adequately.
- Percutaneous access may be difficult because of the position of adjacent organs.

Open technique:

1- Incision → generous (good adequate length).

→ Dependant.

→ Along skin crease.

→ Parallel to major nerves or vessels.

2- The cavity is explored & open all loculi by finger

3- Packing by gauze (24 hrs)

- Haemostatic.

- Drainage.

Or put a drain (48 – 72 hrs).

4- Hilton's Method:

- Used in important places where there is important structures (nerves, vessels) that may be injured e.g axilla, neck, carotid etc...

Steps:

1- Incise skin & fascia.

2- Introduce a closed sinus forceps & open it inside in the direction of nerves & Vs & withdraw it open.

3- Repeat.

Examples:

1- Parotid abscess:

Blair's incision:

- Vertical incision from ear lobule to angle of mandible → transverse incision in the fascia to avoid facial nerve injury → use Hilton's method.
- Close with drain.

2- Breast abscess:

a- Circum-areolar incision:

- If the abscess is small & near the areola.

b- Radial incision:

- Not reaching the areola to avoid injury of major milk ducts → milk fistula

c- Gillard Thomas:

- In retro-mammary abscess.
- Counter-incision: May be needed in the lower part of the breast in case of independent abscess & drain is passed through it.

3- Perineal abscess:

Ischiorectal abscess:

- General anesthesia → Lithotomy.
- Cruciate incision & trimming of the edges.
- Evacuate → finger breaking of septa, and if pus > 20 cc. → expect supralelevator. (pelvic abscess → open the levator with sinus forceps to evacuate it).

Perianal abscess:

General anesthesia → Lithotomy → cruciate incision, trimming of the edge.

Submucous abscess → proctoscope & diathermy knife.

4- Others:

➤ **Neck:** transverse parallel to skin crease.

➤ **Axilla:** vertical (gap on adduction).

➤ **Fore hand:** transverse (crease).

➤ **Cheek:** semilunar.

➤ **Cubital & pop. Fossa:** transverse.

➤ **Gluteal abscess:**

With direction of gluteus maxims fibers i.e. downwards forwards & laterally.

NB . Abscess where we do not wait for fluctuation: in important areas

a. Parotid.

b. Breast.

c. Pulp.

d. Peri-anal.

B. Cold abscess:

➤ Anti-T.B drugs.

➤ The rule is aspiration (not drainage).

a- Aspiration:

- Independent site.
- Healthy skin area.
- Enter zigzag way.
- Complete aspiration.
- Inject streptomycin.
- Repeat it.

b- Drainage:

In 2 conditions:

- 2ry pyogenic infection.
- Impending rupture.
- Open in independent area → wall is curetted well → dust with streptomycin → close without drain.

Surgical Drains

Drains:

- Classification:
 - Open.
 - Closed.
 - Active.
 - Passive.
- Uses:
 - Withdrawal of fluids.
 - Apposition of tissues to remove potential space by suction.
- Types:
 - Corrugated drain:
 - Safety pin on skin.
 - Shorten everyday.
 - Doesn't get lost.
 - Open passive drain:
 - Simple pack "gauze dressing"
 - Abscess.

- Closed passive:
 - Robertson's.
 - Similar to T-tube
- Closed Active
 - J-Vac (mastectomy) (e.g. thyroidectomy)
 - Closed suction system [Tube + bag + suction]
- Open active
 - Suction in peritoneum
 - Pump

Drains are inserted to:

- Evacuate establish collections of pus, blood or other fluids
- Drain potential collections

Advantages:

- Drainage of fluid removes potential sources of infection
- Drains guard against further fluid collections
- allow the early detection of anastomotic leaks or haemorrhage
- Leave a tract for potential collections to drain following removal

Disadvantage:

- Presence of a drain increases the risk of infection
- Damage may be caused by mechanical pressure or suction
- Drains may induce an anastomotic leak
- Most abdominal drains became infective within 24 hours

Tubes and Drains**NG tube:**

- Decompression:
 - Remove gas at top of stomach
- Long term feeding:
 - 1 week/1 month
 - Silicon narrower and softer
 - Complex carbs/proteins/polypeptides
- Used for acute poisoning
- Made of PVC or Latex (note – fibrosis in latex)
- 45 cm long (Esophagus → 25 cm long)
- Indications:
 - Decompress stomach
 - Prevent aspiration
 - Long term feeding
 - Poisoning
- Contra-indications: basal skull fracture
- Complications:
 - Pressure necrosis → anosmia
 - Aspiration pneumonia/atelectasis
 - Sinusitis
 - Minor upper GIT bleed
 - Epistaxis
 - Pharyngeal irritation
- How to insert one:
 - Explain procedure to the patient
 - Measure from tip of nose around the ear lobes to xiphoid
 - Prepare equipment – sterile, lubricant gel etc
 - Ask patient to swallow as passing tube down (ice chips/water)
 - Gentle and firm continuous pressure
 - Confirm placement by
 - Aspiration of contents

- Inject air and listen for sound with stethoscope
- Low chest x-ray

Orogastric tube:

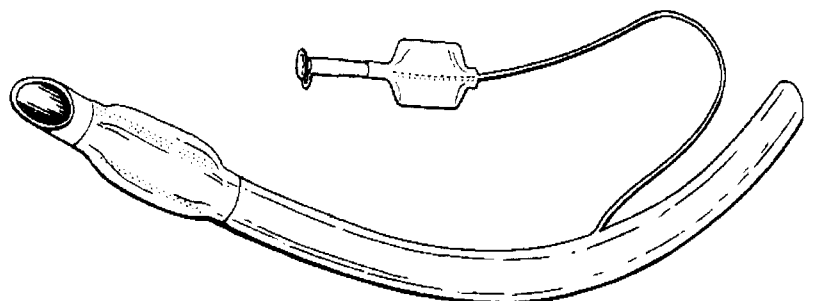
- Poisoning
- Massive upper GI bleed
- Basal skull fracture

Foley Catheter:

- Uses:
 - Drain bladder in acute retention
 - Monitor output
 - Bladder surgery
 - Pelvic surgery e.g. C-section
 - Empty bladder before surgery
- Self-retaining
- 2 channels or 3 channels
- Balloon
- Side arm and valve mechanism ensures balloon stays inflated
- 3-way is wider and harder
 - Can't be left in too long
 - Used for continuous irrigation of bladder in hematuria
- Materials:
 - Latex: change in 3 weeks
 - Silicone: 3 months
 - PVC: intermittent self catheterization
- Complications:
 - UTI's
 - Prevented by
 - Continuous drainage
 - Avoiding stasis
 - Drink a lot of fluids
 - Change regularly
 - Strictures
 - Stone formation
 - Reduced sphincter tone
 - Paraphimosis
 - Blockage
 - By-passing

Endotracheal tube:

- Clear/transparent
- Cuffed/uncuffed
 - Cuffed
 - Aspiration protection.
 - Adults
 - Uncuffed → children.
- Size → internal/outer.
- Graded.
- Radio-opaque line.
- One use only.
- Other types:
 - Double lumen.
 - Reinforced.
 - Laser.



Cuffed endotracheal tube

Laparoscopic surgery

It can be called minimal access surgery that can be categorized as follows:-

- 1. Laparoscopy**
A rigid endoscope is introduced through metal sleeve into peritoneal cavity, which has been inflated by CO₂ to produce pneumoperitoneum
- 2. Thoracoscopy**
A rigid endoscope is introduced through an incision in chest without inflation
- 3. endoluminal endoscopy**
Flexible or rigid endoscope is introduced into hollow organ
- 4. perivisceral endoscopy**
Endoscope is introduced even in absence of natural cavity to visualize body planes as retroperitoneoscope
- 5. Arthroscopy & intra-articular joint**
Endoscope is introduced to the joint e.g. knee, shoulder, hip

Advantage & disadvantage of laparoscopic surgery

Advantage	Disadvantage
1. Decrease in wound size & pain 2. Reduce wound infection, bleeding, dehiscence, herniation & nerve interruption 3. Improve morbidity & mortality 4. Improve vision 5. Decrease wound trauma & heat loss	1. Loss of tactile feedback 2. Dependence on hand-eye coordination 3. Difficulty with haemostasis 4. reliance on remote vision & operating

Preoperative preparation of laparoscopic surgery.

1. Overall fitness.
2. Patient is fully informed & consented.
3. Normal coagulation.
4. Thromboprophylaxis .
5. Evaluation if there are any previous operation or not .

Difficulty during laparoscopic operations

1. Previous abdominal surgery
2. Obesity
3. Bleeding (may need laparotomy)
4. Hepatosplenomegaly, Ascetics , Pregnancy

Postoperative care

1. most common routine postoperative symptoms are
2. Dull upper abdominal pain & shoulder pain → Simple analgesics
3. Nausea → antiemetic e.g. ondansetron
4. orogastric tube → if there is stomach distention & should be removed as soon as operation is over
5. Oral feeding start 4-6 h after surgery
6. Urinary catheter → removed once the patient is retain his consciousness
7. Discharge from hospital after 24h as long as patient feeling comfort & eat
8. Remove skin sutures after 48h
9. Mobility & convalescence

► References:

- B. & L. → P. 107.
- Principles of Surgery for MRCS, P.92

Principle of common laparoscopic procurers

Laposcopic cholecystectomy "Lapchole"

- ✓ It is become the treatment of choice for gall bladder stones
- ✓ it is contraindicated in pregnancy

preoperative preparation

1. Patient is put in trendelenburg position "for cephalic traction of gall bladder"
2. Crepe bandage in lower limb to avoid DVT
3. Patient is catheterized

Steps

1. Apply verres needle below the umbilicus
2. Insufflate the abdomen by CO₂ "14 mmHg"
3. Introduce the trocar & Cannula then leave the cannula .
4. Introduce the camera from port below the umbilicus to inspect the whole abdomen
5. put the patient in anti trendelenburg position & change the direction of camera towards liver
6. Introduce other 3 ports
 - 1st → 2 finger breadth below costal margin in right anterior axillary line
 - 2nd → 2 finger breadth below the costal margin in midclavicular line for grasping the hartman's pouch
 - 3rd → 2 finger breadth below the xiphisternum for operating port
7. Perform as open cholecystectomy

Advantage

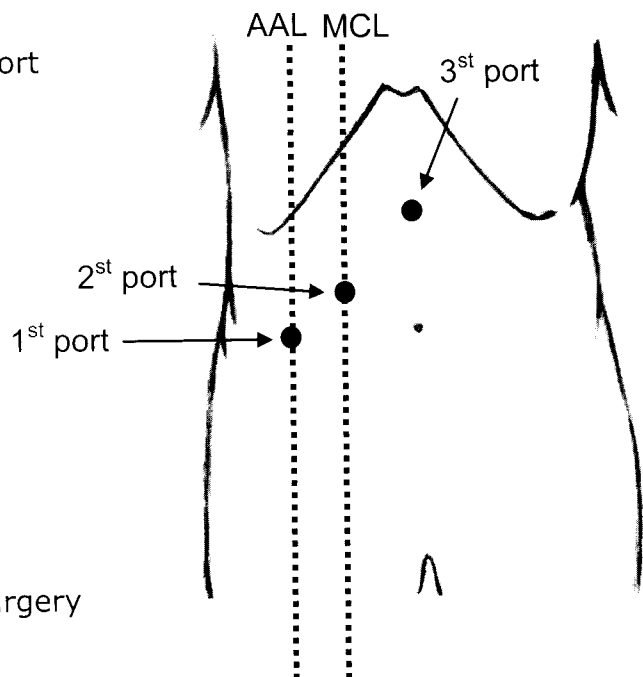
1. Better cosmetically
2. Post-operative pain is less severe
3. Post-operative stay in hospital is short
4. Earlier return to work.

Contraindications:

1. Pregnancy
2. Carcinoma of the gall bladder
3. Bleeding diathesis
4. Compromise of the cardiovascular or respiratory function

Contraindications:

1. Marked obesity
2. Liver cirrhosis
3. Empyema of the gall bladder
4. Previous upper abdominal surgery (relative contraindication)



► References:

- B. & L. → P. 113.

Laparoscopic inguinal hernia

➤ It is indicated in multiple & recurrent hernia

Types of laparoscopic hernia repair

1. Trans abdominal pre-peritoneal repair (TAPP)
 - Abdominal inflated under GA with CO₂
 - Peritoneum incised above the hernia
 - prosthetic mesh stapled over the defect
 - Peritoneum is opposed over the mesh by use of stapling device
2. Extra-peritoneal Repair
 - Surgical balloons are inflated in the extra peritoneal space instead of entering abdominal cavity.
 - Endoscopic trocars & instrument are placed in operating tunnel
 - Stapled prosthetic mesh is used for repair

► References:

- B. & L. → P. 114.

Laparoscopic antireflux surgery

Advantage over the open surgery

1. The incidence of operative & postoperative complication is low
2. Reduction in hospital stay
3. Reduction in wound complication
4. Earlier return to normal activities

➤ There is no reason to expect better symptomatic results than the open one

Techniques.... !

Nissen fundoplication

1. Access is achieved via 5 port arrangement with surgeon standing to the left, right or between the legs of the patient, depending on preference
2. Mobilization of the esophagus is underway
3. Liver should be adequately retracted

➤ Rossetti Modification

It involves using just the anterior fundus to perform the wrap reducing the amount of gastro-esophagus dissection needed & making division of the short gastric vessels unnecessary

4. The wrap is secured with four or five silk sutures that may be tied intra-corporal or extra-corporal technique

➤ Nissen didn't consider closure of the hiatus by bringing the crura together behind the esophagus

Intraoperative complications:-

- | | |
|------------------------------------|-----------------------------------|
| 1. Unrecognized pleural laceration | 3. Gastric perforation |
| 2. Hepatic laceration | 4. wrap necrosis with perforation |

Post operative side effects :-

- | | |
|--|----------------|
| 1. Early satiety (The commoner) | 4. Nausea |
| 2. Hyperflatulence | 5. Odynophagia |
| 3. Diarrhea | |
| 6. postoperative dysphagia (which can be low incidence by entrancement of liquid 3weeks after surgery) | |

► References:

- B. & L. → P. 115.

Laparoscopic Appendectomy

- Mostly indicated as diagnostic tool in suspected appendicitis in women of child-bearing age

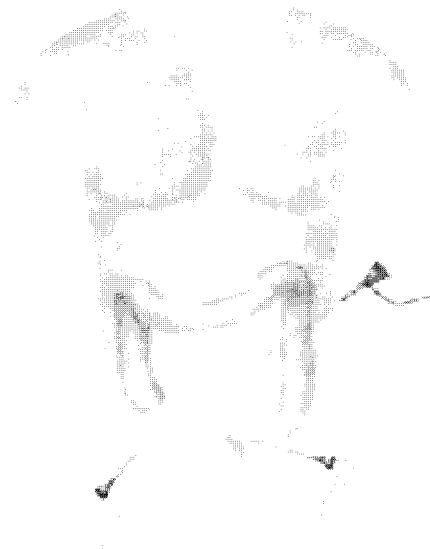
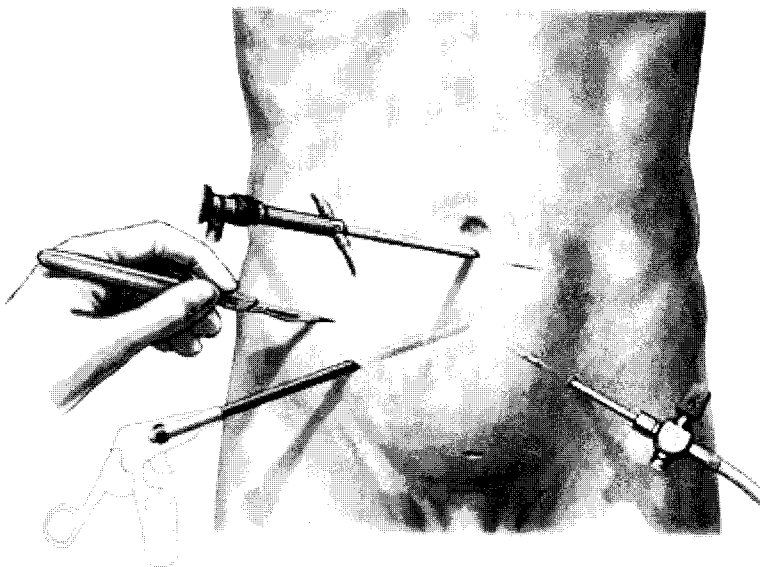
Steps

- Patient is positional in a moderate trendelenburg tilt to deliver loops of SI from pelvis
- Creating pneumoperitoneum with open is safer than closed one with veress needle
- After placing of operating ports, appendix is found by identifying the caecal taenia
- Controlling & elevation of appendix with laparoscopic forceps to displace the mesoappendix
- A window in the meso-appendix is created to allow ligation or coagulation of appendicular vessels
- Ligation of the base of appendix with absorbable loop ligature
- Dividing & remove the appendix through operating ports
- Single absorbable suture used to close linea alba at the umbilicus , subcuticular suture for skin incision

► References:

- B. & L. → P. 124.

Laparoscopic incisions





Minor surgeries

Cricothyroidotomy

■ Indications:

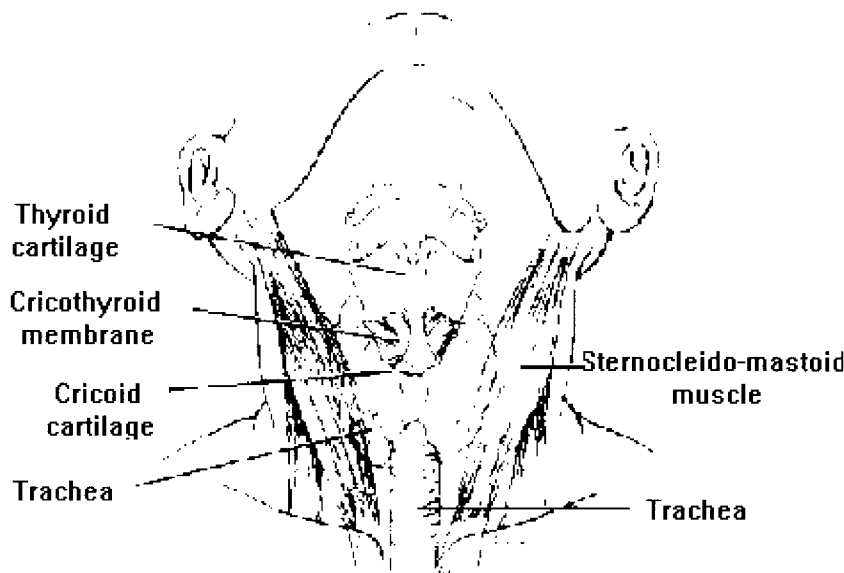
1. When a secure airway need to be maintained.
2. Orotracheal and nasotracheal intubation have failed.

■ Contraindications:

- It is contraindicated if any other less radical means of securing airway is feasible.

■ Anatomy:

- The cricothyroid membrane lies between the thyroid cartilage superiorly and the cricoid cartilage inferiorly.
- It can be felt by palpating the neck anteriorly and finding first the thyroid cartilage that is the most prominent cartilage in the neck.
- After that you need scroll down your index finger until you can fell the space between the thyroid and cricoid cartilages.
- This space is the place of the cricothyroid membrane. "The image below will help you to find it".



■ Materials:

- 1- Material for sterile technique (gloves, mask, cap and gown).
- 2- Povidone-iodine solution for sterilizing the skin
- 3- Sponges
- 4- Drapes and rolled bath towel
- 5- No. 11 scalpel blade.
- 6- 1% lidocaine without epinephrine in a 10-cc syringe with a 25-gauge needle
- 7- Two mosquitoes
- 8- Low pressure cuffed tracheostomy tube
- 9- A 10 cc syringe to inflate the balloon on the tracheostomy tube
- 10-Bag valve mask (Ambu) connected to a oxygen source
- 11-Adhesive tape

■ Technique:

► **It is very important to sterilize the skin.**

- 1- Prepare all necessary equipment and test the tracheostomy tube by inflating the tube with air from 10-cc syringe. Place the material on bedside table.
- 2- One of the most important aspects is to position the patient . He or she should be supine, with a pillow under the shoulders, and with the neck in hyperextension.
- 3- Sterilize the skin from the sternal notch to chin and laterally to the base of the neck.
- 4- Identify the cricothyroid membrane as described above
- 5- Anesthetize the skin over the membrane using the 10-cc syringe with 25-gauge needle with the 1% lidocaine.
- 6- Make a transverse incision of the skin over the cricothyroid membrane using the No. 11 blade.
- 7- Identify the membrane and then continue the incision through it. approximately 1 cm on each side of the midline.
- 8- With the mosquito in the left hand, insert the clamp into the incision and spread it . This is sufficient to provide an airway for a patient with supraglottic airway obstruction.
- 9- With the right hand insert the tracheostomy tube through the incision into the trachea, directing it caudally.
- 10- Connect the bag-valve unit to the tube and ventilate the patient the patient with 100% oxygen.
- 11- Observe respiratory movements of the chest and breath sounds.
- 12- Inflate the tube balloon
- 13- Cut a sponge halfway down the middle, and wrap it around the tube. If you are using the tracheostomy tube secure the wings of the tube.
- 14- Suction the trachea
- 15- Obtain a chest x-ray to check the position of the tube.

■ Complications:

1. Large visible external scar from the incision
2. Subglottic stenosis
3. Bleeding
4. Accidental perforation of the esophagus
5. Fracture of the larynx
6. Pneumothorax, which is a condition in which air has entered the space around the lungs
7. Damage to the vocal cords resulting in hoarseness or a changed voice

Nasogastric tube (NGT)

■ Indications:

1. To empty the stomach for fear of aspiration in emergencies
2. For gastric lavage
3. For enteral feeding.

■ Technique:

1. Position: sitting or supine with patient's neck flexed
2. Lubricate the tube, introduce it into the patent naris and advance it into the nasopharynx
3. Ask the patient to swallow. Swallowing allows the tube to advance into the oesophagus and then into the stomach

N.B : This is confirmed by aspiration of gastric content or by auscultation of injected air.

4. The tube is taped to the nose, without pressing on the naris and connected to a collection bag.

N.B : Patency is ensured by injecting 20 ml saline/4 hrs.

■ Complications:

1. Ulceration and necrosis of the naris.
2. Oesophageal reflux, oesophagitis, oesophageal erosion and oesophageal stricture.
3. Mouth breathing, mouth dryness and possibly parotitis.
4. Interference with ventilation and coughing, retention of bronchial secretions, atelectasis and pneumonia.
5. Loss of fluids.
6. Other complications including traumatic epistaxis, sinusitis and otitis media.

N.B : These complications are minor, however with prolonged use of the tube they become commoner.

Urethral catheterization

■ Indications:

1. Urine retention.
2. Urine output monitoring for critical patients.
3. Irrigation of blood clots.
4. As a stent after urethral surgery.
5. Intravesical chemotherapy for superficial bladder cancer.
6. To allow healing after minor extraperitoneal ruptures and after open urinary bladder surgery.
7. For cystourethrography.

■ Contraindications:

- When urethral injury is suspected.

■ Technique:

A. For men:

1. Use sterile gloves and prepare the external genitalia of the patient by disinfectant solution.
2. Inject 10 ml of xylocaine gel through the meatus.
3. Hold the penis with the left hand to be perpendicular to the body .

N.B: This straighten the anterior urethra

4. Lubricate a Foley's catheter and using the right hand introduce it through the meatus.
5. Push it gently and steadily until urine passes out.

N.B: In adults the recommended size of Foley's catheter is

6. Inflate the balloon with 10 ml saline.
7. Connect it to a urine collecting bag.

N.B: In cases with enlarged prostate the urethra is narrowed and kinked, thus making the procedure difficult. A Coude-tip catheter is often helpful to negotiate the angle between bulbous and membranous urethra.

B. For women:

1. Supine position with the hips flexed and abducted and the knees flexed.
2. The left hand spreads apart the labia minora to expose the urethral meatus and the right hand passes the catheter up to the bladder.
3. There is no need to pass the catheter up to its end. It usually brings urine after a short passage.

■ Complications:

1. Urinary tract infection.
2. Urethral injury especially in cases with prostate enlargement.
3. Excessive diuresis after the relief of acute retention may produce hypovolaemia.

Tracheal intubation

■ Indications:

1. For administration of general anesthesia.
2. To allow for mechanical ventilation.

■ Technique:

1. Drugs given to facilitate intubation:
 - a. Induction agent → Thiopental
 - b. Neuromuscular blocking agent → Succinylcholine
2. Position: Supine with flexion of the neck and extension of the head

N.B: In trauma victims, fracture of cervical spine should be excluded first to avoid spinal cord injury

3. Pre-oxygenation with mask ventilation
4. Gentle downward pressure on the thyroid cartilage by an assistant.
5. Stand at the head of the patient, a laryngoscope is grasped in the left hand and the blade is gently placed in the right side of the mouth.
6. The tongue is moved to one side of the oral cavity while moving the blade toward the larynx.
7. Lift the laryngoscope anteriorly to expose the vocal cord.
8. The tube with deflated cuff is passed under vision into the right side of the mouth and through the vocal cord.

N.B: A 6-8 mm tube is usually suitable for adults.

9. The endotracheal tube is placed so that the cuff is just distal to the cords. The balloon is inflated with 5-10 ml of air.
10. Correct position is checked.

N.B: This is done by inspecting the chest for symmetrical movements with insufflations of air and breath sounds are auscultated.

■ Complications:

1. Oesophageal intubation.
2. Minor lacerations to the tongue, lips and gums.
3. Dental damage.

Central venous catheterization

- This is done either through the subclavian or internal jugular vein.

■ Indications:

1. Central venous pressure (CVP) monitoring.
2. Parenteral nutrition.
3. Long term infusion of drugs. e.g cytotoxic agents.

■ Contraindications:

1. Coagulopathy.
2. Burns or skin infection at the site of entrance.

■ Technique of subclavian vein catheterization:

1. Position is supine with the head tilted downward.
2. The operator uses mask, gown and gloves and prepare the subclavian area with antiseptics.
3. Local infiltration of xylocaine at an area 0.5 cm below the clavicle and 2 cm lateral to it's intersection with the first rib. "Always aspirate before injection"
4. Puncture the anesthetized skin using a wide needle attached to a syringe. While aspirating the needle is advanced slowly horizontally in direction of suprasternal notch.

N.B: When needle is in subclavian vein this is signaled by free aspiration of blood.

5. A finger is placed over the needle & the syringe is removed.
6. A guide wire "J wire" is passed through the needle with its tip directed toward the heart. The needle is kept in place until the wire passes into the vein "Seldinger technique". The wire must pass without resistance.
7. The needle is then removed and the central venous catheter is introduced over the guide wire to a length of 15 cm on the right and 18 cm on the left.
8. The wire is removed and the catheter is sutured to the skin, then cover the skin with sterile dressing.
9. Confirm placement into superior vena cava by chest x-ray and rule out pneumothorax.

■ Technique of internal jugular vein catheterization:

1. Position is supine with the head tilted downward. The patient's head is turned 45° contralaterally.
2. The middle of the posterior border of the sternomastoid is located and overlying skin is anaesthetized. Then the muscle is grasped firmly and elevated slightly to fix the internal jugular vein.
3. While maintaining aspiration the needle is passed slowly deep to the muscle in a direction between it's sternal and clavicular heads.
4. The rest is as above in subclavian venous catheterization.

■ Complications:

1. Malpositioning.
2. Pneumothorax caused by pleural injury.
3. Air embolism. Either during insertion or later during therapy course.
4. Arterial puncture.
5. Infection of the catheter causing septicaemia.

N.B: In case of infection: Broad spectrum antibiotics are started and the catheter should be removed and it's tip is sent for culture and sensitivity.

Venous cut-down

■ Indications:

- When percutaneous access to the venous system cannot be gained.

N.B:

- ▶ For infants: Use the long saphenous vein.
- ▶ For adults: Any accessible vein. e.g: Cephalic, antecubital or long saphenous vein.

■ Technique of long saphenous cut down:

1. Prepare the skin at the ankle region.
2. Infiltrate the skin with xylocaine.
3. A 2 cm transverse skin incision is done.
4. Dissect the vein using fine tipped curved artery forceps.
5. Two ligatures are done, one distal to dissection and one proximal.
6. A small transverse venotomy is made with fine tipped scissors and an IV cannula is passed into the vein.
7. IV infusion is started.
8. The skin is closed with interrupted sutures. Antibiotics ointment and then a sterile dressing are applied.

N.B :

- ▶ In adults the long saphenous vein is consistently located 1 cm anterior and 1 cm superior to the medial malleolus.
- ▶ The saphenous nerve should be separated from the vein to avoid its injury

■ Complications:

- 1) Bleeding.
- 2) Infection and thrombophlebitis.
- 3) Injury of the saphenous nerve.

Drainage of anorectal abscess

■ Urgent surgery (incision and drainage under general anesthesia).

1. General anesthesia
2. Examination under anesthesia and sigmoidoscopy / colonoscopy for detection of internal fistulous opening.
3. If perianal or ischiorectal → drainage under general anesthesia by Cruciate incision with excision of skin edges.
4. If submucous → drainage through proctoscopy.
(If it is after injection sclerotherapy, it usually resolves spontaneously.)
5. If pelvi-rectal → transrectal drainage.
6. With a finger in the anorectum, careful curettage of the walls of the abscess to avoid iatrogenic fistula formation.
7. Antibiotics are not essential except for certain situations as diabetic, immuno-compromized patients, or presence of extensive cellulitis.
8. The wound is packed with daily dressings.



Surgical operation

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